ML11

ML11 LOGIC TEST
CZMLACO

AH-S390C-MC
FICHE 1 OF 3

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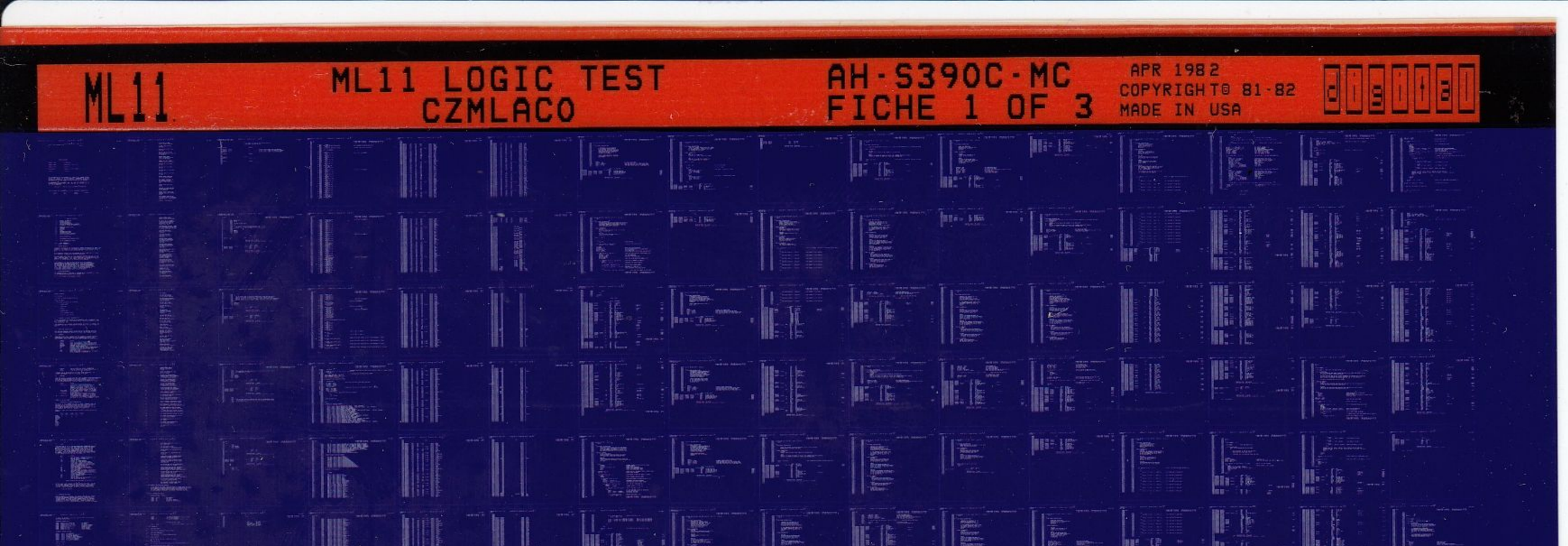

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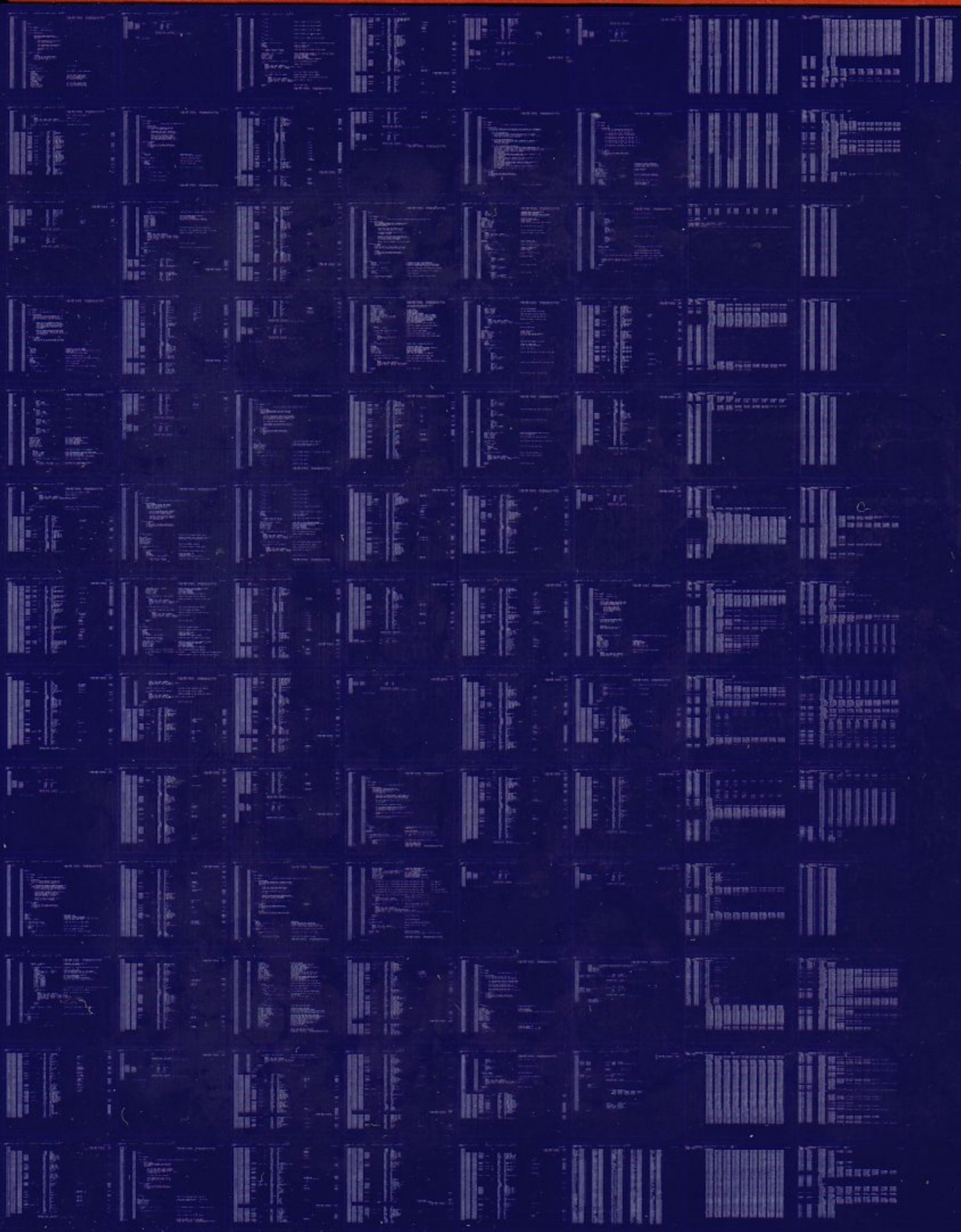

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1                                .TITLE CZMLACO ML-11 LOGIC TEST
          .SBTTL USER DOCUMENTATION
                                                                .REM &
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IDENTIFICATION

PRODUCT CODE:	AC-S388C-MC
PRODUCT NAME:	CZMLACO ML11 LOGIC TEST
PRODUCT DATE:	19-MAY-81
MAINTAINER:	STORAGE SYSTEMS DIAGNOSTICS
AUTHOR:	D.W.NEALE

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1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

DIAGNOSTIC ENGINEERING WAS CONTRACTED BY MEMORY ENGINEERING TO MAKE THIS DIAGNOSTIC IN ORDER TO AID MEMORY ENGINEERING TO DESIGN AND DEBUG THE ML-11, AID FIELD SERVICE FOR FIELD REPAIRS AND INSTALLATIONS OF THE ML-11.

THIS DIAGNOSTIC PRODUCT WILL BE DESIGNED TO TEST FROM ONE TO EIGHT ML-11 UNITS OFF A SINGLE RH11 OR RH70 CONTROLLER.

THE FUNCTIONAL LEVEL (FRU) OF THIS DIAGNOSTIC PRODUCT WILL BE TO THE LOGIC FUNCTION LEVEL (I.E. DRIVE SELECTION). UPON DETECTION OF AN ERROR BY THE DIAGNOSTIC, THE LOGIC FUNCTION AND RESPECTIVE MODULE WHICH IT IS LOCATED ON WILL BE PRINTED TO THE OPERATOR.

THIS DIAGNOSTIC HAS BEEN WRITTEN FOR USE WITH THE DIAGNOSTIC RUNTIME SERVICES SOFTWARE (SUPERVISOR). THESE SERVICES PROVIDE THE INTERFACE TO THE OPERATOR AND TO THE SOFTWARE ENVIRONMENT. THIS PROGRAM CAN BE USED WITH XXDP+, ACT, APT, SLIDE AND PAPER TAPE. FOR A COMPLETE DESCRIPTION OF THE RUNTIME SERVICES, REFER TO THE XXDP+ USER'S MANUAL. THERE IS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES IN SECTION 2 OF THIS DOCUMENT.

1.2 SYSTEM REQUIREMENTS

THE HARDWARE DESIGN IS EXPECTED TO CONFORM TO THE STANDARDS SET FORTH IN THE MASSBUS SPECIFICATION (DEC STANDARD 159).

PDP-11 WITH MINIMUM OF 28K WORDS OF MEMORY

CONSOLE TERMINAL

RH11 OR RH70

1 TO 8 ML-11 DRIVES ON INTERMIXED BUS

XXDP+ LOAD MEDIA

1.3 RELATED DOCUMENTS AND STANDARDS

1. SUPPRGC.DOC
2. SUPINT.MEN
3. SUPFUN.C
4. XXDPPLUS.DOC
5. BLISS LANGUAGE GUIDE
6. BLISS-16 USER'S GUIDE

1.4 DIAGNOSTIC HIERARCY PREREQUISITES

IT WILL BE ASSUMED THAT PRIOR TO THE RUNNING OF THIS DIAGNOSTIC THAT ALL APPROPRIATE CPU, MAIN MEMORY AND RH CONTROLLER DIAGNOSTICS HAVE BEEN SUCCESSFULLY RUN.

THIS DIAGNOSTIC WILL HOWEVER PERFORM MINIMAL RH TESTS TO ENSURE ITS EXISTANCE AND BASIC FUNCTIONALITY BEFORE LOGIC TESTS ARE ALLOWED TO RUN.

2.0 OPERATING INSTRUCTIONS

THIS SECTION CONTAINS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES. FOR DETAILED INFORMATION, REFER TO THE XXDP+ USER'S MANUAL (CHQUS).

2.1 COMMANDS

THERE ARE ELEVEN LEGAL COMMANDS FOR THE DIAGNOSTIC RUNTIME SERVICES (SUPERVISOR). THIS SECTION LISTS THE COMMANDS AND GIVES A VERY BRIEF DESCRIPTION OF THEM. THE XXDP+ USER'S MANUAL HAS MORE DETAILS.

COMMAND	EFFECT
START	START THE DIAGNOSTIC FROM AN INITIAL STATE
RESTART	START THE DIAGNOSTIC WITHOUT INITIALIZING
CONTINUE	CONTINUE AT TEST THAT WAS INTERRUPTED (AFTER ^C)
PROCEED	CONTINUE FROM AN ERROR HALT
EXIT	RETURN TO XXDP+ MONITOR (XXDP+ OPERATION ONLY!)
ADD	ACTIVATE A UNIT FOR TESTING (ALL UNITS ARE CONSIDERED TO BE ACTIVE AT START TIME
DROP	DEACTIVATE A UNIT
PRINT	PRINT STATISTICAL INFORMATION (IF IMPLEMENTED BY THE DIAGNOSTIC - SECTION 4.0)

DISPLAY	TYPE A LIST OF ALL DEVICE INFORMATION
FLAGS	TYPE THE STATE OF ALL FLAGS (SEE SECTION 2.3)
ZFLAGS	CLEAR ALL FLAGS (SEE SECTION 2.3)

A COMMAND CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. SO YOU MAY, FOR EXAMPLE, TYPE "STA" INSTEAD OF "START".

2.2 SWITCHES

THERE ARE SEVERAL SWITCHES WHICH ARE USED TO MODIFY SUPERVISOR OPERATION. THESE SWITCHES ARE APPENDED TO THE LEGAL COMMANDS. ALL OF THE LEGAL SWITCHES ARE TABULATED BELOW WITH A BRIEF DESCRIPTION OF EACH. IN THE DESCRIPTIONS BELOW, A DECIMAL NUMBER IS DESIGNATED BY "DDDDD".

SWITCH	EFFECT
/TESTS:LIST	EXECUTE ONLY THOSE TESTS SPECIFIED IN THE LIST. LIST IS A STRING OF TEST NUMBERS, FOR EXAMPLE - /TESTS:1:5:7-10. THIS LIST WILL CAUSE TESTS 1,5,7,8,9,10 TO BE RUN. ALL OTHER TESTS WILL NOT BE RUN.
/PASS:DDDDD	EXECUTE DDDDD PASSES (DDDDD = 1 TO 64000)
/FLAGS:FLGS	SET SPECIFIED FLAGS. FLAGS ARE DESCRIBED IN SECTION 2.3.
/EOP:DDDDD	REPORT END OF PASS MESSAGE AFTER EVERY DDDDD PASSES ONLY. (DDDDD = 1 TO 64000)
/UNITS:LIST	TEST/ADD/DROP ONLY THOSE UNITS SPECIFIED IN THE LIST. LIST EXAMPLE - /UNITS:0:5:10-12 USE UNITS 0,5,10,11,12 (UNIT NUMBERS = 0-63)

EXAMPLE OF SWITCH USAGE:

```
START/TESTS:1-5/PASS:1000/EOP:100
```

THE EFFECT OF THIS COMMAND WILL BE: 1) TESTS 1 THROUGH 5 WILL BE EXECUTED, 2) ALL UNITS WILL TESTED 1000 TIMES AND 3) THE END OF PASS MESSAGES WILL BE PRINTED AFTER EACH 100 PASSES ONLY. A SWITCH CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. YOU MAY, FOR EXAMPLE, TYPE "/TES:1-5" INSTEAD OF "/TESTS:1-5".

BELOW IS A TABLE THAT SPECIFIES WHICH SWITCHES CAN BE USED BY EACH COMMAND.

	TESTS	PASS	FLAGS	EOP	UNITS
START	X	X	X	X	X
RESTART	X	X	X	X	X
CONTINUE		X	X	X	
PROCEED			X		
DROP					X
ADD					X
PRINT					
DISPLAY					X
FLAGS					
ZFLAGS					
EXIT					

2.3 FLAGS

FLAGS ARE USED TO SET UP CERTAIN OPERATIONAL PARAMETERS SUCH AS LOOPING ON ERROR. ALL FLAGS ARE CLEARED AT STARTUP AND REMAIN CLEARED UNTIL EXPLICITLY SET USING THE FLAGS SWITCH. FLAGS ARE ALSO CLEARED AFTER A START COMMAND UNLESS SET USING THE FLAG SWITCH. THE ZFLAGS COMMAND MAY ALSO BE USED TO CLEAR ALL FLAGS. WITH THE EXCEPTION OF THE START AND ZFLAGS COMMANDS, NO COMMANDS AFFECT THE STATE OF THE FLAGS; THEY REMAIN SET OR CLEARED AS SPECIFIED BY THE LAST FLAG SWITCH.

FLAG	EFFECT
HOE	HALT ON ERROR - CONTROL IS RETURNED TO RUNTIME SERVICES COMMAND MODE
LOE	LOOP ON ERROR
IER*	INHIBIT ALL ERROR REPORTS
IBE*	INHIBIT ALL ERROR REPORTS EXCEPT FIRST LEVEL (FIRST LEVEL CONTAINS ERROR TYPE, NUMBER, PC, TEST AND UNIT)
IXE*	INHIBIT EXTENDED ERROR REPORTS (THOSE CALLED BY PRINTX MACRO'S)
PRI	DIRECT MESSAGES TO LINE PRINTER
PNT	PRINT TEST NUMBER AS TEST EXECUTES
BOE	"BELL" ON ERROR
UAM	UNATTENDED MODE (NO MANUAL INTERVENTION)
ISR	INHIBIT STATISTICAL REPORTS (DOES NOT APPLY TO DIAGNOSTICS WHICH DO NOT SUPPORT STATISTICAL REPORTING)
IDU	INHIBIT PROGRAM DROPPING OF UNITS
ADR	EXECUTE AUTODROP CODE
LOT	LOOP ON TEST
EVL	EXECUTE EVALUATION (ON DIAGNOSTICS WHICH HAVE EVALUATION SUPPORT)

*ERROR MESSAGES ARE DESCRIBED IN SECTION 3.1

SEE THE XXDP+ USER'S MANUAL FOR MORE DETAILS ON FLAGS. YOU MAY SPECIFY MORE THAN ONE FLAG WITH THE FLAG SWITCH. FOR EXAMPLE, TO CAUSE THE PROGRAM TO LOOP ON ERROR, INHIBIT ERROR REPORTS AND TYPE A "BELL" ON ERROR, YOU MAY USE THE FOLLOWING STRING:

```
/FLAGS:LOE:IER:BOE
```

2.4 HARDWARE QUESTIONS

WHEN A DIAGNOSTIC IS STARTED, THE RUNTIME SERVICES WILL PROMPT THE USER FOR HARDWARE INFORMATION BY TYPING "CHANGE HW (L) ?" YOU MUST ANSWER "Y" AFTER A START COMMAND UNLESS THE HARDWARE INFORMATION HAS BEEN "PRELOADED" USING THE SETUP UTILITY (SEE CHAPTER 6 OF THE XXDP+ USER'S MANUAL). WHEN YOU ANSWER THIS QUESTION WITH A "Y", THE RUNTIME SERVICES WILL ASK FOR THE NUMBER

```
OF UNITS (IN DECIMAL).  YOU WILL THEN BE ASKED THE FOLLOWING
QUESTIONS FOR EACH UNIT.

PARAMETER CODING CALLS

GPRMA   MSGH1,0,0,0,177777,YES          ;RH ADDRESS
GPRMD   MSGH2,2,0,77,11,70,YES          ;RH TYPE
GPRMD   MSGH3,4,0,777,0,777,YES         ;RH VECTOR ADDRESS
GPRMD   MSGH4,6,D,77,1,16.,YES          ;NUMBER FO ARRAYS
GPRML   MSGH5,10,1,YES                  ;DRIVE OPTIONS
GPRMD   MSGH6,12,0,7,0,7,YES            ;DRIVE NUNBER
GPRML   MSGH7,14,1,YES                  ;PARITY DISABLED

PARAMETER CODING MESSAGES

MSGH1:  .ASCIZ  /RH ADDRESS?/
MSGH2:  .ASCIZ  /IS RH AN '70' OR '11?/
MSGH3:  .ASCIZ  /RH VECTOR ADDRESS?/
MSGH4:  .ASCIZ  /NUMBER OF ARRAY MODULES?/
MSGH5:  .ASCIZ  /IS DRIVE OPTION AN ML11A?/
MSGH6:  .ASCIZ  /ML-11 DRIVE NUMBER?/
MSGH7:  .ASCIZ  /IS PARITY DISABLED?/

SAMPLE DIALOGE

DR> STA  <CR>

CHANGE HW <L>  ?  Y  <CR>

# UNITS <D>  ? 1  <CR>

UNIT 0
RH ADDRESS <O> 176400  ?  <CR>
IS RH AN '70' OR '11' <O>  ?  <CR>
RH VECTOR ADDRESS <O>  204  ?  <CR>
  MBER OF ARRAYS MODULES  ? <D>  16  ?  14  <CR>
  DRIVE OPTION AN ML11A ? <L>  Y  ?  <CR>
ML-11 DRIVE NUMBER ? <O>  0  ?  <CR>
IS PARITY DISABLED ? <L>  N  ?  <CR>
```

2.5 SOFTWARE QUESTIONS

AFTER YOU HAVE ANSWERED THE HARDWARE QUESTIONS OR AFTER A RESTART OR CONTINUE COMMAND, THE RUNTIME SERVICES WILL ASK FOR SOFTWARE PARAMETERS. THESE PARAMETERS WILL GOVERN SOME DIAGNOSTIC SPECIFIC OPERATION MODES. YOU WILL BE PROMPTED BY "CHANGE SW (L) ?" IF YOU WISH TO CHANGE ANY PARAMETERS, ANSWER BY TYPING "Y". THE SOFTWARE QUESTIONS AND THE DEFAULT VALUES ARE DESCRIBED IN THE NEXT PARAGRAPH(S).

```
PARAMETER CODING CALLS

GPRML  MSGS1,0,1,NO                     ;PRINT THE DRIVE SERIAL NUMBER
```

PARAMETER CODING MESSAGES

MSG1: .ASCIZ /PRINT SERIAL NO.?/

SAMPLE DIALOGE

PRINT SERIAL NO. ? <L> N ? Y <CR>

2.6 EXTENDED P-TABLE DIALOGUE

WHEN YOU ANSWER THE HARDWARE QUESTIONS, YOU ARE BUILDING ENTRIES IN A TABLE THAT DESCRIBES THE DEVICES UNDER TEST. THE SIMPLEST WAY TO BUILD THIS TABLE IS TO ANSWER ALL QUESTIONS FOR EACH UNIT TO BE TESTED. IF YOU HAVE A MULTIPLEXED DEVICE SUCH AS A MASS STORAGE CONTROLLER WITH SEVERAL DRIVES OR A COMMUNICATION DEVICE WITH SEVERAL LINES, THIS BECOMES TEDIOUS SINCE MOST OF THE ANSWERS ARE REPETITIOUS.

TO ILLUSTRATE A MORE EFFICIENT METHOD, SUPPOSE YOU ARE TESTING A FICTIONAL DEVICE, THE XY11. SUPPOSE THIS DEVICE CONSISTS OF A CONTROL MODULE WITH EIGHT UNITS (SUB-DEVICES) ATTACHED TO IT. THESE UNITS ARE DESCRIBED BY THE OCTAL NUMBERS 0 THROUGH 7. THERE IS ONE HARDWARE PARAMETER THAT CAN VARY AMONG UNITS CALLED THE Q-FACTOR. THIS Q-FACTOR MAY BE 0 OR 1. BELOW IS A SIMPLE WAY TO BUILD A TABLE FOR ONE XY11 WITH EIGHT UNITS.

```
# UNITS (D) ?  8<CR>

UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0<CR>
Q-FACTOR (O) 0 ?  1<CR>

UNIT 2
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  1<CR>
Q-FACTOR (O) 1 ?  0<CR>

UNIT 3
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  2<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 4
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  3<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 5
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  4<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 6
CSR ADDRESS (O) ?  160000<CR>
```

```
SUB-DEVICE # (O) ?  5<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 7
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  6<CR>
Q-FACTOR (O) 0 ?  1<CR>

UNIT 8
CSR ADDRESS (O)  160000<CR>
SUB-DEVICE # (O) ?  7<CR>
Q-FACTOR (O) 1 ?  <CR>
```

NOTICE THAT THE DEFAULT VALUE FOR THE Q-FACTOR CHANGES WHEN A NON-DEFAULT RESPONSE IS GIVEN. BE CAREFUL WHEN SPECIFYING MULTIPLE UNITS!

AS YOU CAN SEE FROM THE ABOVE EXAMPLE, THE HARDWARE PARAMETERS DO NOT VARY SIGNIFICANTLY FROM UNIT TO UNIT. THE PROCEDURE SHOWN IS NOT VERY EFFICIENT.

THE RUNTIME SERVICES CAN TAKE MULTIPLE UNIT SPECIFICATIONS HOWEVER. LET'S BUILD THE SAME TABLE USING THE MULTIPLE SPECIFICATION FEATURE.

```
# UNITS (D) ?  8<CR>

UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0,1<CR>
Q-FACTOR (O) 0 ?  1,0<CR>

UNIT 3
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  2-5<CR>
Q-FACTOR (O) 0 ?  0<CR>

UNIT 7
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  6,7<CR>
Q-FACTOR (O) 0 ?  1<CR>
```

AS YOU CAN SEE IN THE ABOVE DIALOGUE, THE RUNTIME SERVICES WILL BUILD AS MANY ENTRIES AS IT CAN WITH THE INFORMATION GIVEN IN ANY ONE PASS THROUGH THE QUESTIONS. IN THE FIRST PASS, TWO ENTRIES ARE BUILT SINCE TWO SUB-DEVICES AND Q-FACTORS WERE SPECIFIED. THE SERVICES ASSUME THAT THE CSR ADDRESS IS 160000 FOR BOTH SINCE IT WAS SPECIFIED ONLY ONCE. IN THE SECOND PASS, FOUR ENTRIES WERE BUILT. THIS IS BECAUSE FOUR SUB-DEVICES WERE SPECIFIED. THE "-" CONSTRUCT TELLS THE RUNTIME SERVICES TO INCREMENT THE DATA FROM THE FIRST NUMBER TO THE SECOND. IN THIS CASE, SUB-DEVICES 2, 3, 4 AND 5 WERE SPECIFIED. (IF THE SUB-DEVICE WERE SPECIFIED BY ADDRESSES, THE INCREMENT WOULD BE BY 2 SINCE ADDRESSES MUST BE ON AN EVEN BOUNDARY.) THE CSR ADDRESSES AND Q-FACTORS FOR THE FOUR ENTRIES ARE ASSUMED TO BE 160000 AND 0 RESPECTIVELY SINCE THEY WERE ONLY SPECIFIED ONCE. THE LAST TWO UNITS ARE SPECIFIED IN THE THIRD PASS.

THE WHOLE PROCESS COULD HAVE BEEN ACCOMPLISHED IN ONE PASS AS SHOWN BELOW.

```
# UNITS (D) ?  8<CR>

UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0-7<CR>
Q-FACTOR (O) 0 ?  0,1,0,,,,1,1<CR>
```

AS YOU CAN SEE FROM THIS EXAMPLE, NULL REPLIES (COMMAS ENCLOSING A NULL FIELD) TELL THE RUNTIME SERVICES TO REPEAT THE LAST REPLY.

2.7 QUICK START-UP PROCEDURE (XXDP+)

TO START-UP THIS PROGRAM:

1. BOOT XXDP+
2. GIVE THE DATE AND ANSWER THE LSI AND 50HZ (IF THERE IS A CLOCK) QUESTIONS
3. TYPE "R NAME", WHERE NAME IS THE NAME OF THE BIN OR BIC FILE FOR THIS PROGRAM
4. TYPE "START"
5. ANSWER THE "CHANGE HW" QUESTION WITH "Y"
6. ANSWER ALL THE HARDWARE QUESTIONS
7. ANSWER THE "CHANGE SW" QUESTION WITH "N"

WHEN YOU FOLLOW THIS PROCEDURE YOU WILL BE USING ONLY THE DEFAULTS FOR FLAGS AND SOFTWARE PARAMETERS. THESE DEFAULTS ARE DESCRIBED IN SECTIONS 2.3 AND 2.5.

3.0 ERROR INFORMATION

3.1 TYPES OF ERROR MESSAGES

THERE ARE THREE LEVELS OF ERROR MESSAGES THAT MAY BE ISSUED BY A DIAGNOSTIC: GENERAL, BASIC AND EXTENDED. GENERAL ERROR MESSAGES ARE ALWAYS PRINTED UNLESS THE "IER" FLAG IS SET (SECTION 2.3). THE GENERAL ERROR MESSAGE IS OF THE FORM:

```
NAME  TYPE  NUMBER  ON UNIT NUMBER  TST NUMBER PC:XXXXXX
ERROR MESSAGE
```

,WHERE; NAME = DIAGNOSTIC NAME
TYPE = ERROR TYPE (SYS FATAL, DEV FATAL, HARD OR SOFT)
NUMBER = ERROR NUMBER
UNIT NUMBER = 0 - N (N IS LAST UNIT IN PTABLE)
TST NUMBER = TEST AND SUBTEST WHERE ERROR OCCURRED
PC:XXXXXX = ADDRESS OF ERROR MESSAGE CALL

BASIC ERROR MESSAGES ARE MESSAGES THAT CONTAIN SOME ADDITIONAL INFORMATION ABOUT THE ERROR. THESE ARE ALWAYS PRINTED UNLESS THE "IER" OR "IBR" FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL MESSAGE.

EXTENDED ERROR MESSAGES CONTAIN SUPPLEMENTARY ERROR INFORMATION SUCH AS REGISTER CONTENTS OR GOOD/BAD DATA. THESE ARE ALWAYS PRINTED UNLESS THE "IER", "IBR" OR "IXR" FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL ERROR MESSAGE AND ANY ASSOCIATED BASIC ERROR MESSAGES.

3.2 SPECIFIC ERROR MESSAGES

ERROR MESSAGES ARE HANDLED VIA A DICTIONARY STRUCTURE.

WORDS AND PHRASES ARE MULTIPLY REFERENCED USING ONLY ONE COPY OF THE WORD OR PHRASE IN CORE.

THIS PERMITS EXTENSIVE ERROR MESSAGE PRINTING AT MINIMAL STORAGE REQUIREMENTS.

THE FOLLOWING DEMONSTRATES TYPICAL ERROR MESSAGES:

```
ML11 DVC FTL ERR 00077 ON UNIT 07 TST 027 SUB 002 PC: 050432
ASYNCHRONOUS MODULE FAILURE
EXCESSIVE DATA ERRORS DURING INITIAL ARR RD_WRT

ML11 DVC FTL ERR  00112 ON UNIT 03 TST 037 SUB 000 PC: 056466
ASYNCHRONOUS MODULE FAILURE
ARRAY ADRS MULTIPLEXER FAILURE
FAILED AT DSA: 000000
```

3.2.1 ERROR NUMBER DEFINITION

ERROR NO.	FAILING LOGIC
1	DRIVE DID NOT RESPOND WITHIN 1.5 US
2	DSA REG READ/WRITE ERROR DURING DRIVE SEL TEST
3	UNIQUE DRIVE SELECTION ERROR
4	ML REGISTER READ WRITE ONES/ZEROES ERROR
5	ML REGISTER READ WRITE ONES/ZEROES ERROR
6	ML REGISTER INITIALIZATION ERROR
7	CONTROL BUS BAD PARITY

NOT DETECTED

8 CONTROL BUS GOOD PARITY NOT DETECTED.

9 CONTROL BUS BAD PARITY GENERATED.

10 ARRAY SIZING LOGIC ERROR

11 GO BIT NOT CLR AFTER NOOP FUNCTION

12 ILF BIT SET DURING NOOP FUNCTION

13 OPI BIT SET DURING NOOP FUNCTION

14 GO BIT NOT SET DURING WRITE CHECK FUNCTION

15 DRY BIT NOT CLEAR DURING WRITE CHECK FUNCTION

16 DRY BIT SET WHEN GO SET DURING WRITE CHECK FUNCTION

17 ILF SET DURING WRITE CHECK FUNCTION

18 OPI BIT SET DURING WRITE CHECK FUNCTION

19 GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'ASYNC FAILURE'

20 GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'SYNC FUNCTION'

21 DRY BIT NOT SET AFTER WRITE CHECK FUNCTION

22 GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'ASYNC FAILURE'

23 GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'SYNC FAILURE'

24 GO BIT NOT SET DURING WRITE FUNCTION

25 DRY BIT CLEAR WITH GO CLEAR DURING WRITE FUNCTION.

26 DRY BIT SET WITH GO BIT DURING WRITE FUNCTION.

27	ILF BIT SET DURING WRITE FUNCTION
28	OPI BIT SET DURING WRITE FUNCTION
29	GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
30	GO BIT NOT CLEAR AFTER WRITE FUNCTION 'SYNC FAILURE'
31	DRY BIT NOT SET AFTER WRITE FUNCTION.
32	GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
33	GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
34	GO BIT NOT SET DURING READ FUNCTION.
35	DRY BIT SET WHILE GO CLEAR DURING READ FUNCTION.
36	DRY BIT SET WHILE GO SET DURING READ FUNCTION.
37	ILF BIT SET DURING READ FUNCTION.
38	OPI BIT SET DURING READ FUNCTION
39	GO BIT NOT CLEAR AFTER READ FUNCTION 'ASYNC FAILURE'
40	GO BIT NOT CLEAR AFTER READ FUNCTION 'SYNC FAILURE'
41	DRY BIT NOT SET AFTER READ FUNCTION
42	GO BIT NOT CLEAR AFTER READ FUNCTION 'ASYNC FAILURE'
43	GO BIT NOT CLEAR AFTER READ FUNCTION 'SYNC FAILURE'
44	GO BIT NOT CLEAR AFTER CLEAR FUNCTION
45	DRY BIT SET WHILE GO SET DURING CLEAR FUNCTION

46	DRY BIT NOT SET AFTER CLEAR FUNCTION.
47	ILF BIT SET DURING CLEAR FUNCTION
48	OPI BIT SET DURING CLEAR FUNCTION
50	COMPOSITE ERROR BIT NOT SET AFTER MLER BITS SET
51	ATA BIT SETTING ERROR
52	ATTN BIT SETTING ERROR
53	ATTN BIT NOT CLEARED BY MLCS1 NOOP FUNCTION
54	ATA BIT NOT CLEAR AFTER WRITING A ONE TO IT
55	WRITING A ONE TO OTHER DRIVES ATA BIT CLEARED THIS DRIVES ATA BIT
56	GO BIT NOT CLEARED AFTER SEARCH FUNCTION
57	ILF BIT SET DURING SEARCH FUNCTION
58	NO-OP FUNCTION DID NOT CLEAR THE ATA BIT AFTER BEING SET
59	ATA BIT NOT SET AFTER SEARCH FUNCTION
60	OPI BIT SET DURING SEARCH FUNCTION AT PRESENT ARRAYS
61	ATA BIT SET AFTER SEARCH AT NOT PRESENT ARRAYS.
62	GO BIT NOT CLEAR AFTER READ-IN-PRESET FUNCTION
63	ILF BIT SET DURING READ-IN-SET FUNCTION
64	OPI BIT SET DURING READ-IN-PRESET FUNCTION
65	UV BIT NOT SET AFTER READ-IN-PRESET

66	GO BIT NOT CLEARED AFTER ILLEGAL FUNCTION
67	ILLEGAL FUNCTION NOT DETECTED
68	OPI BIT SET WITH ILLEGAL FUNCTION
69	RMR BIT NOT SET AFTER MODIFYING REG WITH FUNCTION IN PROGRESS.
70	MEMORY ARRAY PROM CHECK SUM ERRORS DURING INITIAL PROM READS
71	NIBBLE OFF SET COUNTS GREATER THAN 14 DETECTED.
72	UNS BIT SET WITH GOOD UV DATA
73	UNS BIT SET WITH GOOD UV DATA
74	UNS BIT NOT SET WITH BAD UV DATA
75	UNS BIT NOT SET WITH BAD UV DATA
76	MEMORY ARRAY PROM ROW/ COL DATA ORING ERROR
77	BAD NIBBLE THRESHOLD OF 36 EXCEEDED DURING INITIAL ARRAY READ/WRITE TEST
78	UNIQUE PROM SELECTION ERROR
79	FAILURE TO FIND GOOD ROW DURING READ WRITE ARRAY WITH PROM DATA
80	MEMORY ARRAY TIMING AND CONTROL FAILURE TO REFRESH MEMORY
81	DATA ERRORS DETECTED AT LAST BLOCK DURING ADDRESSES COUNTER TEST. (TEST ABORTED)
82	ADDRESS COUNTER ERROR

83	UNIQUE MEMORY ARRAY MODULE SELECTION FAILURE
84	ALL BITS IN ALL NIBBLES TESTED DURING SEQUENCER EXISTENCE TEST WERE IN ERROR (FAIL UNIT)
85	INTERMEDIATE FAILURE. SOME BITS IN NIBBLES TESTED WERE IN ERROR (CONTINUE TESTING)
86	SYNC BUS DATA BIT WRITE PATH CONTINUITY FAILURE
87	SYNC BUS DATA BIT READ PATH CONTINUITY FAILURE.
88	RAM BUS ADRS COUNTER FAILURE TO LOAD/UNLOAD SKIP RAM DURING WRITE FUNCTION
89	RAM BUS ADRS COUNTER FAILURE TO LOAD/UNLOAD SKIP RAM DURING READ FUNCTION.
90	SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (ALL ONES NIBBLE PATTERN)
91	SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (SHIFTED BIT NIBBLE PATTERN)
92	SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (ALL ONES NIBBLE PATTERN)
93	SYNC DATA BUS READ PATH UNIQUE DATA BIT FAILURE
94	NIBBLE OFF SET COUNTERS FAILURE
95	CS1 FUNCTION ABORT FAILURE DURING CLASS 'A' ERROR.
96	CS1 FUNCTION ABORT FAILURE DURING CLASS

'B' ERROR

97	LBT BIT SET BEFORE A LAST BLOCK TRANSFER
98	DSA REGISTER INCREMENT FAILURE DURING NON LAST BLOCK TRANSFERS.
99	LBT BIT NOT CLEAR AFTER LOADING DSA REG
100	LBT BIT NOT SET AFTER A LAST BLOCK TRANSFER
101	DSA REGISTER INCREMENT FAILURE AFTER A LAST BLOCK TRANSFER
102	IAE BIT NOT SET AT INVALID SECTOR ADDRESSES
103	AOE BIT NOT SET AFTER ADDRESS OVERFLOW
104	SC BIT NOT AFTER CS1 FUNCTION ADORT
105	GOOD DATA BUS PARITY NOT DETECTED
106	GOOD DATA BUS PARITY NOT GENERATED
107	UNS BIT SET AFTER WRITING TO A SECTOR DURING PROM DATA TEST
108	UNS BIT NOT SET WITH BAD UV DATA
109	WCE BIT SET DURING MBUS WRITE/READ FUNCTION TROUBLE SHOOTING LOOP TEST
110	UNIQUE REGISTER SELECTION TEST FAILURE
111	FAILURE TO FIND GOOD MOS RAM ROW DURING ARRAY ADRS MUX TEST (INTERMEDIATE DIAG MSG)

112	UNIQUE ARRAY MODULE ROW/COL ADDRESSING FAILURE
113	DRIVE TYPE REGISTER VALUE WAS NOT CORRECT
114	TRE BIT SET UNEXPECTEDLY DURING A WRITE CHECK TRANSFER (INTERMEDIATE DIAG ERROR)
115	TRE BIT SET UNEXPECTEDLY DURING A WRITE TRANSFER (INTERMEDIATE DIAG ERROR)
116	TRE BIT SET UNEXPECTEDLY DURING A READ TRANSFER (INTERMEDIATE DIAG ERROR)
117	TRE BIT DID NOT SET AFTER A REGISTER MODIFICATION ERROR (EXCEPTION WAS NOT ASSERTED)
118	DATA DIAGNOSTIC REGISTER D1 D2 E2 INITIALIZATION ERRORS
119	RH CONTROLLER FAILURE TO RESPOND TO EXISTANCE PROBE
120	NED BIT SET DURING MASS BUS TO UNIBUS COMMUNICATION PROBE
121	DATA DIAGNOSTIC REGISTER D1 D2 E2 ONE'S / ZEROE'S READ WRITE ERRORS
122	DATA DIAGNOSTIC REGISTER D1 D2 E2 SHIFTING 1'S AND 0'S READ WRITE ERRORS
123	ECC HARD ERROR BIT NOT SET WHEN UNCORRECTABLE ECC ERRORS WERE READ
124	ECC ERROR REGISTER FAILURE TO LATCH FAILING ERROR CORRECTION INFORMATION
125	ECC ERROR REGISTER FAILURE TO CLEAR
126	ECC ERROR LOCATION REGISTER FAILED TO CLOCK IN DSA ADDRESS
127	ECC ERROR LOCATION REGISTER DATA BIT ERRORS
128	ECC ERROR LOCATION REGISTER INITIALIZATION ERRORS
129	ECC HARD ERROR BIT FAILED TO SET NOT SET

130 DATA CHECK ERROR BIT FAILED TO SET / NOT SET

131 CRC DATA BUS FAILURE. BIT CONTINUITY / UNIQUENESS ERRORS

132 UNIQUE NIBBLE CRC GENERATION CODE FAILURES

133 UNIQUE WORD CRC GENERATION CODE FAILURES

134 CORRECTABLE ERROR SYNDRONE DECODE FAILURE. FAILURE TO COMPLIMENT EXPECTED FAILING BIT(S)

135 CORRECTABLE ERROR SYNDRONE DECODE FAILURE. UNEXPECTED BIT(S) FOUND COMPLIMENTED

136 ECH OR UNC BIT NOT SET DURING READS WITH ECC ERRORS IN CHANNEL > 35

137 ERROR CORRECTION WAS NOT INHIBITED DURING UNCORRECTABLE ECC ERRORS. UNEXPECTED BIT(S) WERE FOUND COMPLIMENTED

138 ECH OR UNC BIT NOT SET WHEN MULTIPLE CHANNEL ERRORS WERE READ

139 ERROR CORRECTION WAS NOT INHIBITED DURING UNCORRECTABLE ECC ERROR. UNEXPECTED BIT(S) WERE FOUND COMPLIMENTED

140 ECC FAILURE TO DETECT AND CORRECT SINGLE BIT CHANNEL ERRORS

141 ECC FAILURE TO DETECT AND CORRECT MULTIPLE BIT CHANNEL ERRORS

4.0 PERFORMANCE AND PROGRESS REPORTS

AT THE END OF EACH PASS, THE PASS COUNT IS GIVEN ALONG WITH THE TOTAL NUMBER OF ERRORS REPORTED SINCE THE DIAGNOSTIC WAS STARTED. THE "EOP" SWITCH CAN BE USED TO CONTROL HOW OFTEN THE END OF PASS MESSAGE IS PRINTED. SECTION 2.2 DESCRIBES SWITCHES.

5.0 DEVICE INFORMATION TABLES

HARDWARE DEFAULT PTABLE

```
.WORD   176400          ;RH ADDRESS
.WORD   70              ;RH TYPE
.WORD   204             ;RH VECTOR ADDRESS
.WORD   16.             ;NUMBER OF ARRAY MODULES
```

```
                .WORD   1               ;IS DRVE OPTION ML11A,  1=16K,  0=64K
                .WORD   0               ;ML-11 DRIVE NUMBER
                .WORD   0               ;IS PARITY DISABLED,  1=YES,  0=NO

                                        SOFTWARE DEFAULT TABLE

                PRSN:   .WORD   1               ;PRINT SERIAL NUMBER, 1=YES,  0=NO
```

6.0 TEST SUMMARIES

TST1. MASS BUS READY

TEST THE RH CONTROLLER FOR EXISTANCE

TST2. MASS BUS HANDSHAKE

TEST MASS BUS ---> UNIBUS COMMUNICATIONS

TST3. DRIVE PRESENT

TEST TO SEE IF THE DRIVE UNDER TEST EXIST.

TST4. DRIVE SELECTION

SEE IF SELECTING OTHER DRIVES ON RH EFFECTS DRIVE UNDER TEST.

TST5. READ WRITE REGISTER ONE'S ZERO'S TEST

TEST REGISTERS READ WRITE CAPABILITY AND UNIQUENESS

TST6. READ WRITE REGISTER SHIFTING ONE'S AND ZEROES

TEST REGISTERS FOR UNIQUE DATA BITS.

TST7. REGISTER INITIALIZATION

TEST REGISTERS FOR CORRECT INIT DATA.

TST8 REGISTER SELECTION TEST

TEST FOR UNIQUE REGISTER SELECTION

TST9. PRINT DRIVE SERIAL NUMBER

PRINT THE CONTENTS OF MLSN IF THE SOFTWARE QUESTION WAS ANSWERED 'YES'.

TST10. C-BUS PARITY

TEST IF DRIVE CAN DETECT BAD PARITY ON C-BUS AND GENERATE GOOD PARITY.

TST11. MEMORY SIZING

SEE IF MEMORY SIZING LOGIC DETECTS AND RECORD CORRECT NUMBER OF ARRAYS PRESENT.

TST12. NO-OP FUNCTION

SEE IF A NO-OP FUNCTION CAN BE EXECUTED.

TST13. WRITE CHECK FUNCTION

SEE IF A WRITE CHECK FUNCTION CAUSES THE DRIVE TO HANG.

TST14. WRITE FUNCTION

SEE IF A WRITE FUNCTION CAUSES THE DRIVE TO HANG.

TST15. READ FUNCTION

SEE IF A READ FUNCTION CAUSES THE DRIVE TO HANG.

TST16. CLEAR FUNCTION

SEE IF A CLEAR FUNCTION CAN BE EXECUTED.

TST17. DIAGNOSTIC REGISTER READ WRITE

TEST THE DIAGNOSTIC REGISTERS FOR
1'S/0'S , SHIFTING 1'S/0'S AND
INITIALIZATION

TST18. COMPOSITE ERROR BIT TEST

SEE IF EACH INDIVIDUAL ERROR BIT IN MLER CAUSES A COMPOSITE ERROR.

TST19. ATA BIT

TEST IF THE ATA BIT CAN BE SET AND CLEARED.

TST20. SEARCH FUNCTION

SEE IF A SEARCH FUNCTION CAN BE EXECUTED ON ALL PRESENT ARRA-YS.

TST21. READ IN PRESET

TEST IF A READ IN PRESET FUNCTION SETS VOL V H.

TST22. ILLEGAL FUNCTION

SEE IF WRITING AN ILLEGAL FUNCTION TO CS1 CAN BE DETECTED AND THAT A TRANSFER IS NOT INITIATED.

TST23. REGISTER MODIFICATION REFUSED

TEST TO SEE IF WRITING TO SPECIFIC REGISTERS ARE ABORTED WHILE THE DRIVE IS ACTIVE. SEE IF WRITING TO NON-SPECIFIC REGISTERS ARE ALLOWED WHILE DRIVE IS ACTIVE.

TST24. INITIAL PROM TEST

TEST PROMS FOR EXISTENCE.

TST25. PROM 'OR' FUNCTION TEST

TEST THE PROM DATA ORING FUNC

TST26. UV ERROR TEST

TEST ABILITY OF UV ERR PROMS TO DETECT ALL POSSIBLE CHECK SUM ERRORS.

TST27. INITIAL ARRAY TEST

TEST ARRAY TIMING AND CONTROLFOR EXISTENCE.

TST28. PROM SELECTION TEST

TEST FOR UNIQUE PROM SELECTION.

TST29. READ WRITE MEMORY ARRAY WITH PROM DATA (DIAG MODE)

SEE IF MEMORY CAN BE WRITTEN AND READ.

ALSO FIND ERROR FREE BLOCK OF MEMORY FOR FUTURE TESTS.

TST30. REFRESH TIMING

TEST TO SEE IF MEMORY CAN BE REFRESHED.

TST31. ADDRESS COUNTER

TEST THE ADDRESS COUNTER FOR ABILITY TO COUNT THROUGH ALL POSSIBLE MEMORY ADDRESSES.

TST32. ARRAY MODULE SELECTION

TEST FOR UNIQUE ARRAY MODULE SELECTION

TST33. SEQUENCER EXISTENCE TEST

TEST TO SEE IF BASIC SEQUENCER TIMING EXISTS.

TST34. SYNC DATA BUS CONTINUITY/WRITE PATH

TEST SYNCHRONOUS DATA BUS WRITE PATH FOR CONTINUITY BY READ-ING WRITING ONE'S AND ZERO'S.

TST35. SYNC DATA BUS CONTINUITY/READ PATH

TEST SYNCHRONOUS DATA BUS READ PATH FOR CONTINUITY BY READING WRITING ONE'S AND ZEROES.

TST36. RAM-BUS ADDRESS COUNTER/WRITE PATH

TEST ABILITY OF THE RAM-BUS ADDRESS COUNTERS TO LOAD/UNLOAD

THE SKIP DURING WRITE FUNCTIONS.

TST37. RAM BUS ADRS COUNTER/READ PATH

TEST ABILITY OF RAM/BUS ADRS COUNTERS TO LOAD/UNLOAD THE SKIP RAM DURING READ FUNCTIONS.

TST38. SYNC DATA BUS BIT UNIQUENESS/WRITE PATH

TEST SYNCHRONOUS DATA BUS FOR DATA BIT UNIQUENESS BY WRITING SHIFTING PATTERNS OF ONE'S AND ZERO'S TO THE ML.

TST39. SYNC DAT BUS BIT UNIQUENESS/READ PATH

TEST SYNCHRONOUS DATA BUS READ PATH FOR DATA BIT UNIQUENESS BY WRITING SHIFTING PATTERNS OF ONES AND ZEROES TO THE

TST40. ARRAY ADDRESS MUX

TEST FOR UNIQUE ROW AND COLUMN ADDRESSING

TST41. NIBBLE OFFSET

TEST NIBBLE OFFSET COUNTERS TO COUNT TO 14 NIBBLE DATA TO BE SHIFTED ON DETECTION OF BAD NIBBLES.

TST42. CS1 FUNCTION ABORT

SEE IF A CLASS 'B' ERROR ABORTS A FUNCTION WHILE IN PROGRESS.

SEE IF A CLASS'A' ERROR IS DETECTED BUT FUNCTION IS ALLOWED TO COMPLETE.

TST43. LAST BLOCK INDICATOR

TEST THE LAST BLOCK INDICATOR BIT FOR NOT SETTING BELOW THE LAST AND SETTING AND CLRING AT THE LAST BLOCK

TST44. INVALID ADDRESS TEST

FOR ALL ILLEGAL DSA ADDRESSES READ THE IAE BIT SET.

TST45. ADDRESS OVERFLOW

TEST FOR AOE ON TRANSFERS WHICH EXTEND BEYOND THE LAST BLOCK.

TST46. SYNC BUS PARITY

TEST FOR BAD PARITY DETECTION AND GOOD PARITY GENERATION.

TST47. WRITE READ MEMORY ARRAY (M-BUS BLOCK MODE)

WRITE READ MEMORY VIA M-BUS BLOCK WITH MINIMUM OVERHEAD

TST48. TEST THE CRC DATA BUS BETWEEN THE CRC GENERATORS AND THE CRC/MBUS DATA

MUX FOR CONTINUITY AND BIT UNIQUENESS

TST49. TEST CRC CODES GENERATED FOR ONE CRC GROUP (52 UNIQUE NIBBLES)

TST50. TEST CRC CODES GENERATED FOR ONE CRC GROUP (13 UNIBUS WORDS)

TST51. TEST SYNDRONE DECODE AND ERROR CORRECTION TO DECODE AND CORRECT SINGLE BIT AND MULTIPLE BIT CHANNEL ERRORS

TST52. TEST SYNDRONE DECODE TO DETECT BUT NOT CORRECT UNCORRECTABLE CHANNEL ERRORS

TST53. TEST SYNDRONE DECODE TO DETECT BUT NOT CORRECT UNCORRECTABLE MULTIPLE CHANNEL ERRORS

TST54. TEST SYNDRONE GENERATION, SYNDRONE DECODE AND ERROR CORRECTION FOR SIGLE BIT CHANNEL ERRORS

TST55. TEST SYNDRONE GENERATION, SYNDRONE DECODE AND ERROR CORRECTION FOR MULTIPLE BIT CHANNEL ERRORS

TST56. TEST THE ECC ERROR REGISTER FOR CLEARING AND LATCHING OF ECC ERROR INFORMATION ON DETECTION OF ECC ERRORS

TST57. TEST THE ECC ERROR LOCATION REGISTER FOR CLOCKING, BIT UNIQUENESS, CLEARING AND LATCHING

TST58. VIA ECC_DM AND ECC_DIS TEST THE ECH BIT FOR SETTING AND NOT SETTING

TST59. VIA ECC_EN, ECC_DM AND ECC_DIS TEST THE DCK BIT FOR SETTING AND NOT SETTING

TST60. FROM DATA TEST

VERIFY THAT CHECK SUM VALUES FOR ALL PROM LOCATIONS ARE CORRECT.

&

```
                                .SBTTL  PROGRAM HEADER AND TABLES

000000                                  .ENABL  ABS,AMA
        002000                          .       =       2000

002000                                  BGNMOD

                                ;++
                                ; THE PROGRAM HEADER IS THE INTERFACE BETWEEN
                                ; THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
                                ;--

002000                                  POINTER ALL


002000                                  HEADER  CZMLA,C,0,1800.,0

                                ;
                                ;       NAMES OF DEVICES SUPPORTED BY THIS PROGRAM
                                ;
002122                                  DEVTYP <ML-11>



                                ;
                                ;       TEST DESCRIPTION
                                ;
002130                                  DESCRIPT <ML-11 LOGIC TEST>


                                ;
                                ;       THE GLOBAL ERROR TABLE (INFORMATION
                                ;       USED IN A CALL TO THE MACRO "ERROR")
                                ;

002152                          ERRTBL
002152  000000                  ERRTYP::        .WORD   0
002154  000000                  ERRNBR::        .WORD   0
002156  000000                  ERRMSG::        .WORD   0
002160  000000                  ERRBLK::        .WORD   0

                                ;++
                                ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRES OF EACH TEST.
                                ; IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
                                ;--

002162                                  DISPATCH 60


                                ;++
                                ; THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
                                ; THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
                                ; IS IDENTICAL TO THE STRUCTURE OF THE HARDWARE P-TABLES,
                                ; AND IS USED AS A "TEMPLATE" FOR BUILDING THE P-TABLES.
                                ;--
```

```
                                        BGNHW   DFPTBL
                                
                                
002356  176400                          .WORD   176400          ;RH ADDRESS
002360  000070                          .WORD   70              ;RH TYPE
002362  000204                          .WORD   204             ;RH VECTOR ADDRESS
002364  000020                          .WORD   16.             ;NUMBER OF ARRAY MODULES
002366  000001                          .WORD   1               ;IS DRVE OPTION ML11A,  1=16K,  0=64K
002370  000000                          .WORD   0               ;ML-11 DRIVE NUMBER
002372  000000                          .WORD   0               ;IS PARITY DISABLED,  1=YES,  0=NO
                                
002374                                  ENDHW
                                
                                
                                
                                ;++
                                ; THE DEFAULT SOFTWARE P-TABLE CONTAINS VARIOUS DATA USED BY THE
                                ; PROGRAM AS OPERATIONAL PARAMETERS.  THESE PARAMETERS ARE SET
                                ; UP AT ASSEMBLY TIME AND MAY BE VARIED BY THE OPERATOR AT RUN
                                ; TIME.
                                ;--
                                
002374                                  BGNSW   SFPTBL
                                
                                
002376  000001                  PRSN:   .WORD   1               ;PRINT SERIAL NUMBER, 1=YES,  0=NO
                                
002400                                  ENDSW
```

```
                                        ;++
                                        ; THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
                                        ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                        ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                        ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                        ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                        ; WITH THE OPERATOR.
                                        ;--

002400                                          BGNHRD

002402                                          GPRMA   MSGH1,0,0,0,177777,YES
002412                                          GPRMD   MSGH2,2,0,77,11,70,YES
002424                                          GPRMD   MSGH3,4,0,777,0,777,YES
002436                                          GPRMD   MSGH4,6,D,77,1,16.,YES
002450                                          GPRML   MSGH5,10,1,YES
002456                                          GPRMD   MSGH6,12,0,7,0,7,YES
002470                                          GPRML   MSGH7,14,1,YES

002476                                          ENDHRD

002476  122     110     040     MSGH1:  .ASCIZ  /RH ADDRESS?/
002512  111     123     040     MSGH2:  .ASCIZ  /IS RH AN '70' OR '11?/
002540  122     110     040     MSGH3:  .ASCIZ  /RH VECTOR ADDRESS?/
002563  116     125     115     MSGH4:  .ASCIZ  /NUMBER OF ARRAY MODULES?/
002614  111     123     040     MSGH5:  .ASCIZ  /IS DRIVE OPTION AN ML11A?/
002646  115     114     055     MSGH6:  .ASCIZ  /ML-11 DRIVE NUMBER?/
002672  111     123     040     MSGH7:  .ASCIZ  /IS PARITY DISABLED?/
                                        .EVEN

                                        ;++
                                        ; THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
                                        ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                        ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                        ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                        ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                        ; WITH THE OPERATOR.
                                        ;--

002716                                          BGNSFT

002720                                          GPRML   MSGS1,0,1,YES
                                                .EVEN

002726                                          ENDSFT

002726  120     122     111     MSGS1:  .ASCIZ  /PRINT SERIAL NO.?/             ;PRINT DRIVE SERIAL NUMBER?
                                        .EVEN
```

```
                                ;++
                                ; THIS TABLE IS USED BY THE RUNTIME SERVICES
                                ; TO PROTECT THE LOAD MEDIA.
                                ;--

002750                                  BGNPROT

002750  177777                         -1              ;OFFSET INTO P-TABLE FOR CSR ADDRESS
002752  177777                         -1              ;OFFSET INTO P-TABLE FOR MASSBUS ADDRESS
002754  177777                         -1              ;OFFSET INTO P-TABLE FOR DRIVE NUMBER

002756                                  ENDPROT


002756                          $PATCH::
002756                                  .BLKW   20

003016                                  ENDMOD
```

```
      6 ;ML3                                                    1-May-1981 10:49:46    TOPS-20 Bliss-16 V2(212)
      7 ;                                                       1-May-1981 10:49:37    PA:<NEALE>ML3.BLI.1 (1)
      8
      9 ;          0001  MODULE ML3 =
     10 ;          0002  BEGIN
     11 ;          0003
     12 ;          0004  REQUIRE 'BLSMAC.REQ';
     13 ;          1494
     14 ;          1495  !+
     15 ;          1496  !  THE REPORT CODING SECTION CONTAINS THE
     16 ;          1497  ! ''PRINTS'' CALLS THAT GENERATE STATISTICAL REPORTS.
     17 ;          1498  !-
     18 ;          1499
     19 ;          1500  BGNRPT;
     20 ;          1501  RETURN;
     21 ;          1502  ENDRPT;
     25
     26
     27                                        .SBTTL  LRPT
     28
     32 004152  000207                 LRPT:   RTS     PC                              ;                       1493
     33
     34                                 ; Routine Size:  1 word
     35                                 ; Maximum stack depth per invocation:  0 words
     40
     41
     45
     46                                        .SBTTL  L$RPT
     50 004154  004767  177772          L$RPT:: JSR     PC,LRPT                         ;                       1501
     51 004160  104425                          TRAP    25
     52 004162  000207                          RTS     PC
     53
     54                                 ; Routine Size:  4 words
     55                                 ; Maximum stack depth per invocation:  0 words
```

```
                        1503
                        1504  !+
                        1505  ! THE AUTODROP CODE IS EXECUTED IMMEDIATELY AFTER THE INITIALIZE
                        1506  ! CODE IF THE "ADR" FLAG WAS SET.  THE UNIT(S) UNDER TEST ARE
                        1507  ! CHECKED TO SEE IF THEY WILL RESPOND.  THOSE THAT DON'T ARE IMMEDIATELY
                        1508  ! DROPPED FROM TESTING.  ISSUE A "DODU" FOR THOSE THAT DON'T RESPOND.
                        1509  !-
                        1510
                        1511  BGNAUTO;
                        1512  RETURN;
                        1513  ENDAUTO;

                                                .SBTTL  LAUTO
004164  000207                          LAUTO:  RTS     PC                              ;                       1502

                                        ; Routine Size:  1 word
                                        ; Maximum stack depth per invocation:  0 words


                                                .SBTTL  L$AUTO
004166  004767  177772                  L$AUTO::JSR     PC,LAUTO                        ;                       1512
004172  104461                                  TRAP    61
004174  000207                                  RTS     PC

                                        ; Routine Size:  4 words
                                        ; Maximum stack depth per invocation:  0 words

                        1514
```

```
                                                                                                                    E 3
116 ;ML3
117 ;
118
119 ;          1515  !+
120 ;          1516  ! THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
121 ;          1517  ! TO NO LONGER BE TESTED.
122 ;          1518  !-
123 ;          1519
124 ;          1520  BGNDU;
125 ;          1521  RETURN;
126 ;          1522  ENDDU;
130
131                                        .SBTTL  LDU
135 004176  000207                 LDU:    RTS     PC                                      ;                       1513
136
137                                ; Routine Size:  1 word
138                                ; Maximum stack depth per invocation:  0 words
143
144
148
149                                        .SBTTL  L$DU
153 004200  004767  177772         L$DU::  JSR     PC,LDU                                  ;                       1521
154 004204  104453                         TRAP    53
155 004206  000207                         RTS     PC
156
157                                ; Routine Size:  4 words
158                                ; Maximum stack depth per invocation:  0 words
163
164
165 ;          1523
166 ;          1524  !+
167 ;          1525  ! THE ADD-UNIT SECTION CONTAINS ANY CODE THE PROGRAMMER WISHES
168 ;          1526  ! TO BE EXECUTED IN CONJUNCTION WITH THE ADDING OF A UNIT BACK
169 ;          1527  ! TO THE TEST CYCLE.
170 ;          1528  !-
```

```
                                                        1-May-1981 10:49:46    TOPS-20 Bliss-16 V2(212)
                                                        1-May-1981 10:49:37    PA:<NEALE>ML3.BLI.1 (1)

;          1529
;          1530  BGNAU;
;          1531  RETURN;
;          1532  ENDAU;


                                .SBTTL  LAU
004210  000207                  LAU:    RTS     PC                              ;                       1522

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words


                                .SBTTL  L$AU
004212  004767  177772          L$AU::  JSR     PC,LAU                          ;                       1531
004216  104452                          TRAP    52
004220  000207                          RTS     PC

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words


;          1533  END
;          1534
;          1535  ELUDOM
```

```
                        ;ML3                                                    1-May-1981 10:49:46    TOPS
                        ;                                                       1-May-1981 10:49:37    PA:<
                        ; Size:          20 code + 0 data words
                        ; Run Time:      00:03.6
                        ; Elapsed Time: 00:12.2
                        ; Memory Used:  24 pages
                        ; Compilation Complete
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (1)

0001  MODULE ML4 =
0002  BEGIN
0003  !
0004  ! PRETTY BLF COMMANDS
0005  !
0006  !<BLF/NOERROR>
0007  !<BLF/LOWERCASE_KEY>
0008  !
0009  ! REQUIRE
0010  !
0011
0012  require 'BLSMAC.REQ';                             !BLISS INTERFACE MODULE
1502
1503  !
1504  ! CONSTANT LITERALS
1505  !
1506
1507  literal
1508      ONE = 1,                                      !DATA BIT OF ONE
1509      ONES = %o'177777',                            !DATA PATTERN OF ONES
1510      ZERO = 0,                                     !DATA BIT OF ZERO
1511      ZEROES = 0,                                   !DATA PATTERN OF ZEROES
1512      NUM_OF_REG = 22,                              !NUMBER OF BLOCKS IN GLOBAL STORAGE 'ML-REG'
1513      FIELD_SIZ = 4,                                !FIELD SIZ FOR FIELD DECLARATIONS 'WORD_MAP'
1514      !
1515      !MLCS1 FUNCTION CODES
1516      !
1517      NOOP = 1,                                     !NOOP FUNCTION
1518      DRV_CLR = %o'11',                             !DRIVE CLEAR FUNCTION
1519      RD_IN_PRE = %o'21',                           !READ IN PRESET FUNCTION
1520      SEARCH = %o'31',                              !SEARCH FUNCTION
1521      WRT_CHK = %o'51',                             !WRITE CHECK FUNCTION
1522      write = %o'61',                               !WRITE FUNCTION
1523      read = %o'71',                                !READ FUNCTION
1524      !
1525      ! DELAY ARGUMENTS
1526      !
1527      ONE_US = 1,                                   !ONE MICRO SECOND DELAY
1528      FRTY_US = 40,                                 !FORTY MICRO SECOND DELAY
1529      TWO_TH_US = 2000;                             !TWO THOUSAND MICRO SECOND DELAY
1530
1531  !
1532  ! FIELD DECLARATIONS
1533  !
1534
1535  field
1536      WORD_MAP =                                    !MAPS GLOBAL STORAGE 'ML_REG' INTO REGISTER PERSONALITIES
1537          set
1538          REGISTER_ADD = [0, 0, 16, 0],             !REGISTERS ADDRESS
1539          FORCE_HI = [1, 0, 16, 0],                 !REGISTERS  FORCED HI BITS
1540          FORCE_LO = [2, 0, 16, 0],                 !REGISTERS FORCED LO BITS
1541          DONT_CARE = [3, 0, 16, 0]                 !REGISTERS IGNORE BITS
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (1)

;          1542          tes,
;          1543      NIB_MAP =                         !MAPS OWN STORAGE NIB_SAVE INTO TEN FOUR BIT NIBBLES
;          1544          set
;          1545          NIB_0 = [0, 0, 4, 0],         !NIBBLE 0 BITS <0:3>
;          1546          NIB_1 = [0, 4, 4, 0],         !NIBBLE 1 BITS <4:7>
;          1547          NIB_2 = [0, 8, 4, 0],         !NIBBLE 2 BITS <8:11>
;          1548          NIB_3 = [0, 12, 4, 0],        !NIBBLE 3 BITS <12:15>
;          1549          NIB_4 = [1, 0, 4, 0],         !NIBBLE 4 BITS <16:19>
;          1550          NIB_5 = [1, 4, 4, 0],         !NIBBLE 5 BITS <20:23>
;          1551          NIB_6 = [1, 8, 4, 0],         !NIBBLE 6 BITS <24:27>
;          1552          NIB_7 = [1, 12, 4, 0],        !NIBBLE 7 BITS <28:31>
;          1553          NIB_8 = [2, 8, 4, 0],         !NIBBLE 8 BITS <32:35>
;          1554          NIB_9 = [2, 12, 3, 0]         !NIBBLE 9 BITS <36:39>
;          1555          tes,
;          1556      DT1_FLD =
;          1557          set
;          1558          E0_5 = [0, 0, 6, 0],
;          1559          C0_5 = [0, 6, 6, 0],
;          1560          CRC_DATA = [0, 13, 1, 0],
;          1561          SGL_DATA = [0, 14, 1, 0],
;          1562          UNC_DATA = [0, 15, 1, 0],
;          1563          EE_DATA = [0, 0, 16, 0],
;          1564          A0_5 = [1, 0, 6, 0],
;          1565          P0_5 = [1, 6, 6, 0],
;          1566          ECR_DATA = [1, 12, 1, 0],
;          1567          B0_5 = [2, 0, 6, 0]
;          1568          tes;
;          1569
;          1570  !<BLF/PAGE>
```

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14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (2)

```
;ML4
;
;          1571  !
;          1572  ! OWN STORAGE
;          1573  !
;          1574
;          1575  own
;          1576      NIB_SAVE : block [3] field (NIB_MAP) volatile,
;          1577                                          !STORAGE LOCATION TO SAVE NIBBLE DATA READ DURING DIAG MODE
;          1578      HW_OR_TBL : vector [127] volatile,  !STORES HARDWARE ORED PROM DATA DURING PROM OR FUNC TEST
;          1579      PTBL_PTR : volatile,                !HARDWARE P-TABLE POINTER
;          1580      OP_NUM_ARR : volatile,              !OPERATORS NUMBER  OF ARRAY INPUTTED
;          1581      ARR_INC : volatile,                 !ARRAY SELECTION INCREMENT VALUE
;          1582      GOOD_BLK : volatile,                !GOOD BLOCK ADRS
;          1583      PAR_DIS : volatile,                 !PARITY DISABLE FLAG
;          1584      CHIP_SIZ : volatile,                !MOS RAM CHIP SIZE
;          1585      LST_BLK : volatile,                 !LAST ADDRESSABLE BLOCK
;          1586      ARR_16 : volatile,                  !MAX NUMBER OF ARRAY ALLOWED
;          1587      LST_ARR : volatile,                 !LAST ADDRESSABLE ARRAY
;          1588      IO_BUF : vector [256] volatile,     !INPUT OUTPUT BUFFER
;          1589      STK_OFF : vector [10, byte] volatile,  !STACK OFFSET STORAGE LOCATION
;          1590      stack : vector [198, byte] volatile,   !STACK OF 198 BYTE LOCATIONS
;          1591      PD_TEMP : bitvector [16] volatile,  !PROM DATA STORAGE LOCATION DURING DIAG MODES
;          1592      W_C_SIZE : volatile,                !STORES WORD COUNT FOR 16K OR 64K XFERS
;          1593      RAS_INC : volatile,                 !ROW ADRS STROBE INCREMENT
;          1594      WT_DATA : volatile,                 !SAVE WRITE DATA DURING REG READ WRITE TEST
;          1595      RD_DATA : volatile,                 !SAVE READ DATA DURING REG READ WRITE TEST
;          1596      DRIVE_TYPE : volatile,              !DRIVE TYPE STORAGE LOCATION
;          1597      LST_DUT_REG : volatile,             !LAST ML-11 REG INDEX FOR THIS TYPE RH CONTROLLER
;          1598      REG_INIT_FLG : initial (0) volatile,   !FLAG TO DETECT DOING REG INIT TEST
;          1599      A_CAL : volatile,                   !CALCULATED CRC STORAGE LOCATION
;          1600      B_CAL : volatile,                   !CALCULATED CRC STORAGE LOCATION
;          1601      P_CAL : volatile,                   !CALCULATED CRC STORAGE LOCATION
;          1602      A_GEN : volatile,                   !GENERATED CRC STORAGE LOCATION
;          1603      B_GEN : volatile,                   !GENERATED CRC STORAGE LOCATION
;          1604      P_GEN : volatile,                   !GENERATED CRC STORAGE LOCATION
;          1605  !
;          1606  !<BLF/NOFORMAT>
;          1607  !
;          1608     ML_REG: blockvector [NUM_OF_REG,FIELD_SIZ] field(WORD_MAP) !ML11 REGISTERS
;          1609        preset (                                                !STRUCTURE TO STORE INDIVIDULA
;          1610                                                                !REGISTER PERSONALITIES
;          1611                                                                !ie. REGISTER ADDRESSES
;          1612                                                                !BITS FORCED HIGH
;          1613                                                                !BITS FORCED LOW
;          1614                                                                !READ ONLY BITS
;          1615           [0,FORCE_HI]    = %o'004000',    !MLCS1
;          1616
;          1617           [0,FORCE_LO]    = %o'173701',
;          1618           [0,DONT_CARE]   = %o'160200',
;          1619
;          1620           [5,FORCE_LO]    = %o'25077',     !MLDS
;          1621           [5,FORCE_HI]    = %o'010600',
;          1622           [5,DONT_CARE]   = %o'000100',
```

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```
151 ;ML4
152 ;
153
154 ;          1623
155 ;          1624          [6,FORCE_LO]    = %o'014620',   !MLER
156 ;          1625
157 ;          1626          [7,DONT_CARE]   = %o'177400',   !MLAS
158 ;          1627
159 ;          1628          [8,FORCE_LO]    = %o'100000',   !MLPA
160 ;          1629
161 ;          1630          [10,FORCE_LO]   = %o'000020',   !MLMR
162 ;          1631          [10,DONT_CARE]  = %o'177400',
163 ;          1632
164 ;          1633          [11,FORCE_HI]   = %o'000110',   !MLDT
165 ;          1634          [11,FORCE_LO]   = %o'177666',
166 ;          1635          [11,DONT_CARE]  = %o'000001',
167 ;          1636
168 ;          1637          [13,FORCE_LO]   = %o'140300',   !MLE1
169 ;          1638
170 ;          1639          [14,FORCE_LO]   = %o'100300',   !MLE2
171 ;          1640
172 ;          1641          [17,FORCE_LO]   = %o'010000',   !MLEE
173 ;          1642          [21,DONT_CARE]  = %o'000000'    !MLCS2
174 ;          1643                        ) volatile,
175 ;          1644
176 ;          1645
177 ;          1646  REM_TBL:vector [63,byte]          !REMAINDER TABLE
178 ;          1647    preset (                        !STRUCTURE TO STORE PRECALCULATED
179 ;          1648          [0] = %b'000001',         !CRC REMAINDER VALUES FOR CRC CODE
180 ;          1649          [1] = %b'000010',         !GENERATION
181 ;          1650          [2] = %b'000100',
182 ;          1651          [3] = %b'001000',
183 ;          1652          [4] = %b'010000',
184 ;          1653          [5] = %b'100000',
185 ;          1654          [6] = %b'000011',
186 ;          1655          [7] = %b'000110',
187 ;          1656          [8] = %b'001100',
188 ;          1657          [9] = %b'011000',
189 ;          1658          [10] = %b'110000',
190 ;          1659          [11] = %b'100011',
191 ;          1660          [12] = %b'000101',
192 ;          1661          [13] = %b'001010',
193 ;          1662          [14] = %b'010100',
194 ;          1663          [15] = %b'101000',
195 ;          1664          [16] = %b'010011',
196 ;          1665          [17] = %b'100110',
197 ;          1666          [18] = %b'001111',
198 ;          1667          [19] = %b'011110',
199 ;          1668          [20] = %b'111100',
200 ;          1669          [21] = %b'111011',
201 ;          1670          [22] = %b'110101',
202 ;          1671          [23] = %b'101001',
203 ;          1672          [24] = %b'010001',
204 ;          1673          [25] = %b'100010',
205 ;          1674          [26] = %b'000111',
```

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;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (2)

;          1675          [27] = %b'001110',
;          1676          [28] = %b'011100',
;          1677          [29] = %b'111000',
;          1678          [30] = %b'110011',
;          1679          [31] = %b'100101',
;          1680          [32] = %b'001001',
;          1681          [33] = %b'010010',
;          1682          [34] = %b'100100',
;          1683          [35] = %b'001011',
;          1684          [36] = %b'010110',
;          1685          [37] = %b'101100',
;          1686          [38] = %b'011011',
;          1687          [39] = %b'110110',
;          1688          [40] = %b'101111',
;          1689          [41] = %b'011101',
;          1690          [42] = %b'111010',
;          1691          [43] = %b'110111',
;          1692          [44] = %b'101101',
;          1693          [45] = %b'011001',
;          1694          [46] = %b'110010',
;          1695          [47] = %b'100111',
;          1696          [48] = %b'001101',
;          1697          [49] = %b'011010',
;          1698          [50] = %b'110100',
;          1699          [51] = %b'101011',
;          1700          [52] = %b'010101',
;          1701          [53] = %b'101010',
;          1702          [54] = %b'010111',
;          1703          [55] = %b'101110',
;          1704          [56] = %b'011111',
;          1705          [57] = %b'111110',
;          1706          [58] = %b'111111',
;          1707          [59] = %b'111101',
;          1708          [60] = %b'111001',
;          1709          [61] = %b'110001',
;          1710          [62] = %b'100001'}volatile,
;          1711
;          1712    DT_1:blockvector[5,3] field (DT1_FLD)          !DATA TABLE 1
;          1713    preset (                                       !STRUCTURE TO STORE TEST DATA
;          1714          [0,E0_5] = %b'111111',                   !FOR TEST 56 'ECC ERROR LOCATION TEST'
;          1715          [0,C0_5] = %b'100100',
;          1716          [0,CRC_DATA] = %b'1',
;          1717          [0,SGL_DATA] = %b'1',
;          1718          [0,UNC_DATA] = %b'0',
;          1719          [0,A0_5] = %b'000000',
;          1720          [0,P0_5] = %b'111111',
;          1721          [0,ECA_DATA] = %b'0',
;          1722          [0,B0_5] = %b'000000',
;          1723          [1,E0_5] = %b'111111',
;          1724          [1,C0_5] = %b'100100',
;          1725          [1,CRC_DATA] = %b'1',
;          1726          [1,SGL_DATA] = %b'1',
```

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;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (2)

;          1727          [1,UNC_DATA] = %b'0',
;          1728          [1,A0_5] = %b'111111',
;          1729          [1,P0_5] = %b'000000',
;          1730          [1,ECA_DATA] = %b'0',
;          1731          [1,B0_5] = %b'000000',
;          1732          [2,E0_5] = %b'111111',
;          1733          [2,C0_5] = %b'000101',
;          1734          [2,CRC_DATA] = %b'0',
;          1735          [2,SGL_DATA] = %b'0',
;          1736          [2,UNC_DATA] = %b'1',
;          1737          [2,A0_5] = %b'000000',
;          1738          [2,P0_5] = %b'111111',
;          1739          [2,ECA_DATA] = %b'1',
;          1740          [2,B0_5] = %b'111111',
;          1741          [3,E0_5] = %b'111111',
;          1742          [3,C0_5] = %b'000101',
;          1743          [3,CRC_DATA] = %b'0',
;          1744          [3,SGL_DATA] = %b'0',
;          1745          [3,UNC_DATA] = %b'1',
;          1746          [3,A0_5] = %b'000000',
;          1747          [3,P0_5] = %b'000000',
;          1748          [3,ECA_DATA] = %b'0',
;          1749          [3,B0_5] = %b'111111',
;          1750          [4,E0_5] = %b'111111',
;          1751          [4,C0_5] = %b'000101',
;          1752          [4,CRC_DATA] = %b'0',
;          1753          [4,SGL_DATA] = %b'0',
;          1754          [4,UNC_DATA] = %b'1',
;          1755          [4,A0_5] = %b'111111',
;          1756          [4,P0_5] = %b'000000',
;          1757          [4,ECA_DATA] = %b'1',
;          1758          [4,B0_5] = %b'111111')volatile,
;          1759
;          1760  !
;          1761  !<BLF/FORMAT>
;          1762  !
;          1763      RH_ADD : volatile,                  !RH CONTROLLER BASE ADDRESS
;          1764      RH_TYP : volatile,                  !RH CONTROLLER TYPE
;          1765      RH_VEC : volatile,                  !RH CONTROLLER VECTOR ADDRESS
;          1766      ML_LUN : volatile,                  !ML LOGICAL UNIT NO.
;          1767      ML_DUT : volatile;                  !ML DRIVE NUMBER
;          1768
;          1769  !
;          1770  !<BLF/PAGE>
```

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;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (3)

;          1771  !
;          1772  EQUALS;
;          1773  !
;          1774  ! MACRO DEFINITIONS
;          1775  !
;          1776
;          1777  macro
;          1778  !
;          1779  ! REGISTER NAMES:
;          1780  !
;        M 1781      MLCS1 =
;          1782   .ML_REG [0,REGISTER_ADD]%,          !CONTROL AND STATUS REGISTER 1
;        M 1783      MLWC =
;          1784   .ML_REG [1,REGISTER_ADD]%,          !WORD COUNT REGISTER
;        M 1785      MLBA =
;          1786   .ML_REG [2,REGISTER_ADD]%,          !UNIBUS ADDRESS REGISTER
;        M 1787      MLDA =
;          1788   .ML_REG [3,REGISTER_ADD]%,          !DESIRED ADDRESS REGISTER
;        M 1789      MLCS2 =
;          1790   .ML_REG [4,REGISTER_ADD]%,          !CONTROL AND STATUS REGISTER 2
;        M 1791      MLDS =
;          1792   .ML_REG [5,REGISTER_ADD]%,          !DRIVE STATUS REGISTER
;        M 1793      MLER =
;          1794   .ML_REG [6,REGISTER_ADD]%,          !ERROR REGISTER
;        M 1795      MLAS =
;          1796   .ML_REG [7,REGISTER_ADD]%,          !ATTENTION SUMMARY REGISTER
;        M 1797      MLLA =
;          1798   .ML_REG [8,REGISTER_ADD]%,          !LOOK AHEAD REGISTER
;        M 1799      MLPA =
;          1800   .ML_REG [8,REGISTER_ADD]%,          !PROM ADDRESS REGISTER
;        M 1801      MLDB =
;          1802   .ML_REG [9,REGISTER_ADD]%,          !DATA BUFFER REGISTER
;        M 1803      MLMR =
;          1804   .ML_REG [10,REGISTER_ADD]%,         !MAINTENANCE REGISTER
;        M 1805      MLDT =
;          1806   .ML_REG [11,REGISTER_ADD]%,         !DRIVE TYPE REGISTER
;        M 1807      MLSN =
;          1808   .ML_REG [12,REGISTER_ADD]%,         !SERIAL NUMBER REGISTER
;        M 1809      MLE1 =
;          1810   .ML_REG [13,REGISTER_ADD]%,         !ECC CRC WORD REGISTER 1
;        M 1811      MLE2 =
;          1812   .ML_REG [14,REGISTER_ADD]%,         !ECC CRC WORD REGISTER 2
;        M 1813      MLD1 =
;          1814   .ML_REG [15,REGISTER_ADD]%,         !DATA DIAGNOSTIC REGISTER 1
;        M 1815      MLD2 =
;          1816   .ML_REG [16,REGISTER_ADD]%,         !DATA DIAGNOSTIC REGISTER 2
;        M 1817      MLEE =
;          1818   .ML_REG [17,REGISTER_ADD]%,         !ECC ERROR REGISTER
;        M 1819      MLEL =
;          1820   .ML_REG [18,REGISTER_ADD]%,         !ECC ERROR LOCATION REGISTER
;        M 1821      MLPD =
;          1822   .ML_REG [19,REGISTER_ADD]%,         !PROM DATA REGISTER
```

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;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (3)

;       M 1823      MLBAE =
;         1824    .ML_REG [20,REGISTER_ADD]%,           !BUS ADDRESS EXTENSION REGISTER
;       M 1825      MLCS3 =
;         1826    .ML_REG [21,REGISTER_ADD]%,           !CONTROL AND STATUS REGISTER 3
;         1827    !
;         1828    ! BIT ASSIGNMENTS:
;         1829    !
;       M 1830      SC =
;         1831    (MLCS1)<15,1>%,                       !MLCS1 BIT ASSIGNMENTS
;       M 1832      TRE =
;         1833    (MLCS1)<14,1>%,
;       M 1834      MCPE =
;         1835    (MLCS1)<13,1>%,
;       M 1836      DVA =
;         1837    (MLCS1)<11,1>%,
;       M 1838      RDY =
;         1839    (MLCS1)<7,1>%,
;       M 1840      IE =
;         1841    (MLCS1)<6,1>%,
;       M 1842      GO =
;         1843    (MLCS1)<0,1>%,
;       M 1844      ML_FUNC =
;         1845    (MLCS1)<0,6>%,
;       M 1846      DLT =
;         1847    (MLCS2)<15,1>%,                       !MLCS2 BIT ASSIGNMENTS
;       M 1848      WCE =
;         1849    (MLCS2)<14,1>%,
;       M 1850      PE =
;         1851    (MLCS2)<13,1>%,
;       M 1852      NED =
;         1853    (MLCS2)<12,1>%,
;       M 1854      NEM =
;         1855    (MLCS2)<11,1>%,
;       M 1856      PGE =
;         1857    (MLCS2)<10,1>%,
;       M 1858      MXF =
;         1859    (MLCS2)<9,1>%,
;       M 1860      MDPE =
;         1861    (MLCS2)<8,1>%,
;       M 1862      ORDY =
;         1863    (MLCS2)<7,1>%,
;       M 1864      IRDY =
;         1865    (MLCS2)<6,1>%,
;       M 1866      CLR =
;         1867    (MLCS2)<5,1>%,
;       M 1868      PAT =
;         1869    (MLCS2)<4,1>%,
;       M 1870      BAI =
;         1871    (MLCS2)<3,1>%,
;       M 1872      DRV_NUM =
;         1873    (MLCS2)<0,3>%,
;       M 1874      ATTN =
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (3)

;         1875      (MLDS)<15,1>%,                      !MLDS BIT ASSIGNMENTS
;       M 1876        COMP_ERR =
;         1877      (MLDS)<14,1>%,
;       M 1878        MOL =
;         1879      (MLDS)<12,1>%,
;       M 1880        LBT =
;         1881      (MLDS)<10,1>%,
;       M 1882        DPR =
;         1883      (MLDS)<8,1>%,
;       M 1884        DRY =
;         1885      (MLDS)<7,1>%,
;       M 1886        VV =
;         1887      (MLDS)<6,1>%,
;       M 1888        DCK =
;         1889      (MLER)<15,1>%,                      !MLER BIT ASSIGNMENTS
;       M 1890        UNS =
;         1891      (MLER)<14,1>%,
;       M 1892        OPI =
;         1893      (MLER)<13,1>%,
;       M 1894        IAE =
;         1895      (MLER)<10,1>%,
;       M 1896        AOE =
;         1897      (MLER)<9,1>%,
;       M 1898        ECH_ERR =
;         1899      (MLER)<6,1>%,
;       M 1900        DPAR =
;         1901      (MLER)<5,1>%,
;       M 1902        CPAR =
;         1903      (MLER)<3,1>%,
;       M 1904        RMR =
;         1905      (MLER)<2,1>%,
;       M 1906        ILR =
;         1907      (MLER)<1,1>%,
;       M 1908        ILF =
;         1909      (MLER)<0,1>%,
;       M 1910        ARR_TYP =
;         1911      (MLMR)<10,1>%,                      !MLMR BIT ASSIGNMENTS
;       M 1912        ML_NUM_ARR =
;         1913    (MLMR)<11,5>%,
;       M 1914        REF_MAR =
;         1915      (MLMR)<7,1>%,
;       M 1916        PROM_RW =
;         1917      (MLMR)<6,1>%,
;       M 1918        PROM_DIS =
;         1919    (MLMR)<5,1>%,
;       M 1920        DAT_CLK =
;         1921      (MLMR)<4,1>%,
;       M 1922        DAT_DM =
;         1923      (MLMR)<3,1>%,
;       M 1924        DCK_EN =
;         1925    (MLMR)<2,1>%,
;       M 1926        ECC_DIS =
```

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;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (3)

;        1927   (MLMR)<1,1>%,
;      M 1928      ECC_DM =
;        1929    (MLMR)<0,1>%,
;      M 1930      DRV_TYP =
;        1931    (MLDT)<0,1>%,                                  !MLDT BIT ASSIGNMENTS
;      M 1932      CRC_A =
;      M 1933                                                 !MLE1 BIT ASSIGNMENTS
;        1934   (MLE1)<0,6>%,
;      M 1935      PAR_CRC_WRD =
;        1936   (MLE1)<8,6>%,
;      M 1937      CRC_B =
;      M 1938                                                 !MLE2 BIT ASSIGNMENTS
;        1939   (MLE2)<0,6>%,
;      M 1940      UNC_ERR =
;        1941    (MLEE)<15,1>%,                                 !MLEE BIT ASSIGNMENTS
;      M 1942      SGL_ERR =
;        1943    (MLEE)<14,1>%,
;      M 1944      CRC_ERR =
;        1945    (MLEE)<13,1>%,
;      M 1946      BIT_IN_ERR =
;        1947   (MLEE)<0,8>%,
;      M 1948      CHAN_IN_ERR =
;        1949   (MLEE)<8,6>%,
;        1950   !
;        1951   ! MISCELLANEOUS MACRO DEFINITIONS:
;        1952   !
;      M 1953      SN3 =
;        1954   (MLSN)<12,4>%,
;      M 1955      SN2 =
;        1956   (MLSN)<8,4>%,
;      M 1957      SN1 =
;        1958   (MLSN)<4,4>%,
;      M 1959      SN0 =
;        1960   (MLSN)<0,4>%,
;      M 1961      IS_SET =
;      M 1962                                                 !TEST IF BIT IS EQUAL 1
;        1963   eql 1%,
;      M 1964      IS_NOT_SET =
;      M 1965                                                 !TEST IF BIT IS EQUAL 0
;        1966   eql 0%,
;      M 1967      HI =
;      M 1968                                                 !READS REGISTERS FORCED HI BITS FROM PERSONALITY TABLE
;        1969   ML_REG[.index,FORCE_HI]%,
;      M 1970      LO =
;      M 1971                                                 !READS REGISTERS FORCED LO BITS FROM PERSONALITY TABLE
;        1972   ML_REG[.index,FORCE_LO]%,
;      M 1973      IGNORE =
;      M 1974                                                 !READS REGISTERS DONT_CARE BITS FROM PERSONALITY TABLE
;        1975   ML_REG[.index,DONT_CARE]%,
;      M 1976      MLE2_MASK =
;      M 1977                                                 !READS MLE2 DONT CARE MASK EITHER DATA DIAG OR ECC CIE REG
;        1978   ML_REG[14,DONT_CARE]%,
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (3)

;       M 1979      WRT_MASK =
;       M 1980                                          !GENERATE MASK DATA PATTERN USING REGISTER FORCE LO, HI AND IGNORE B
;         1981    .IGNORE or ((not .LO) and (.HI or .TST_PAT))%,
;       M 1982      CLR_MBUS =
;       M 1983                                          !CLEAR MASS BUS RESTORE DRIVE NUMBER
;         1984    CLR = ONE; DRV_NUM = .ML_DUT%,
;         1985    !<BLF/SYNONYM IS_SET = EQL 1 * >
;         1986    !<BLF/SYNONYM IS_NOT_SET = EQL 0 * >
;         1987    !
;         1988    ! DIAGNOSTIC DATA REGISTER MACROS
;         1989    !
;       M 1990      RD_LNG_WRD =
;       M 1991                                  !READ DATA DIAG REGS INTO BIND LOCATIONS
;       M 1992      D1_TEMP = .MLD1;
;       M 1993      D2_TEMP = .MLD2;
;         1994      E2_TEMP = .MLE2%,
;       M 1995      WRT_LNG_WRD =
;       M 1996                                  !LOADS DATA DIAG REG WITH CONTENTS OF BIND LOCATIONS
;       M 1997      MLD1 = .D1_TEMP;
;       M 1998      MLD2 = .D2_TEMP;
;         1999      MLE2 = .E2_TEMP%,
;       M 2000      TIME_OUT_LOOP =
;       M 2001              !WAIT LOOP DIRING MASS BUS TRANSFER
;       M 2002          do
;       M 2003            0
;         2004          until .DRY;%;
;         2005
;         2006    !
;         2007    ! BIND DECLARATIONS
;         2008    !
;         2009
;         2010    bind
;         2011    !
;         2012    ! ERROR DATA MAPPING FORMATS
;         2013    !
;         2014        FMT_1 = uplit (%asciz'%AEXPECTED: %O6%A    READ: %O6%N%N'),
;         2015        FMT_2 = uplit (%asciz'%AGOOD DATA: %O6%A    BAD DATA: %O6%A    XOR: %O6%N%N'),
;         2016        FMT_3 = uplit (%asciz'%ADRIVE SN: %O6%N%N'),
;         2017        FMT_4 = uplit (%asciz'%ABIT IN ERRCR: %O6%N%N'),
;         2018        FMT_5 = uplit (%asciz'%AGOOD NIB DATA: %O2%A    BAD NIB DATA: %O2%A    NIB POS: %O4%N%N'),
;         2019        FMT_6 = uplit (%asciz'%ANIB IN ERROR: %D4%N%N'),
;         2020        FMT_7 = uplit (%asciz'%AFAILED AT: %O6%N%N'),
;         2021        FMT_8 = uplit (%asciz'%AREPLACE ARR MOD: %D2%N%N'),
;         2022        FMT_9 = uplit (%asciz'%AFAILED AT DSA: %O6%N%N'),
;         2023        FMT_10 = uplit (%asciz'%ABIT<15:10>: %B6%A    BIT<9:0>: %B10%N%N'),
;         2024        FMT_11 = uplit (%asciz'%AFAILING REG ADRS: %O6%N%N'),
;         2025        FMT_12 = uplit (%asciz'%AFAILING FUNC: %O6%N%N'),
;         2026        FMT_13 = uplit (%asciz' %AOFF SET CNT FOR NIB : %D2 %A = %D2 %N%N'),
;         2027        FMT_14 = uplit (%asciz'%AWROTE: %D2%A    READ: %D2%N%N'),
;         2028        FMT_15 = uplit (%asciz'%ANIBBLES XFERED BEFORE ERROR: %D3%N'),
;         2029        FMT_16 = uplit (%asciz'%AFAILING REG: %O6%A GOOD DATA: %O6%A BAD DATA: %O6%N%N'),
;         2030        FMT_17 = uplit (%asciz'%N%ADIAGNOSING UNIT %O1%N%N'),
```

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;          2031      FMT_18 = uplit (%asciz'%ATIMED OUT DURING MBUS %O2%A FUNC%N%N'),
;          2032      FMT_19 = uplit (%asciz'%ACRC GEN = B: %B6%A A: %B6%A P: %B6%N'),
;          2033      FMT_20 = uplit (%asciz'%ACRC CAL = B: %B6%A A: %B6%A P: %B6%N%N'),
;          2034      FMT_21 = uplit (%asciz'%AFAILED AT PLOG: %D2%A CHANNEL: %D2%N%N'),
;          2035      FMT_22 = uplit (%asciz'%AFAILED AT WRD: %D2%A BIT: %D2%N%N'),
;          2036      FMT_23 = uplit (%asciz'%AREGISTER%S3%AADDRESS%S7%ACONTENTS%N%N'),
;          2037      FMT_24 = uplit (%asciz'%S%T%S5%O6%S4%O16%N'),
;          2038      FMT_25 = uplit (%asciz'%S4%T%A:%S%O6'),
;          2039      FMT_26 = uplit (%asciz'%S4%T%A:%S%D1%D1%D1%D1%N'),
;          2040  !
;          2041  ! ERROR MESSAGE MAPPING FORMATS
;          2042  !
;          2043      ONE_FMT = uplit (%asciz'%T%N'),
;          2044      TWO_FMT = uplit (%asciz'%T%T%N'),
;          2045      THR_FMT = uplit (%asciz'%T%T%T%N'),
;          2046      FOR_FMT = uplit (%asciz'%T%T%T%T%N'),
;          2047      FIV_FMT = uplit (%asciz'%T%T%T%T%T%N'),
;          2048      SIX_FMT = uplit (%asciz'%T%T%T%T%T%T%N'),
;          2049      SEV_FMT = uplit (%asciz'%T%T%T%T%T%T%T%N'),
;          2050      EIG_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%N'),
;          2051      NIN_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%N'),
;          2052      TEN_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%T%N'),
;          2053      ELV_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%T%T%N'),
;          2054  !
;          2055  ! DIAGNOSTIC VOCABULARY
;          2056  !
;          2057      !
;          2058      ! WORDS
;          2059      !
;          2060      WRD_1 = uplit (%asciz' GO'),
;          2061      WRD_2 = uplit (%asciz' DRV_RDY'),
;          2062      WRD_3 = uplit (%asciz' ILF'),
;          2063      WRD_4 = uplit (%asciz' OPI'),
;          2064      WRD_5 = uplit (%asciz' BAD'),
;          2065      WRD_6 = uplit (%asciz' GOOD'),
;          2066      WRD_7 = uplit (%asciz' PARITY NOT'),
;          2067      WRD_8 = uplit (%asciz' GENERATED'),
;          2068      WRD_9 = uplit (%asciz' DETECTED'),
;          2069      WRD_10 = uplit (%asciz' ERROR'),
;          2070      WRD_11 = uplit (%asciz' AFTER'),
;          2071      WRD_12 = uplit (%asciz' DURING'),
;          2072      WRD_13 = uplit (%asciz' AT'),
;          2073      WRD_14 = uplit (%asciz' FAILURE'),
;          2074      WRD_15 = uplit (%asciz' ATA'),
;          2075      WRD_16 = uplit (%asciz' ATTN'),
;          2076      WRD_17 = uplit (%asciz' WRITING'),
;          2077      WRD_18 = uplit (%asciz' VV'),
;          2078      WRD_19 = uplit (%asciz' FUNC'),
;          2079      WRD_20 = uplit (%asciz' TRE'),
;          2080      WRD_21 = uplit (%asciz' RMR'),
;          2081      WRD_22 = uplit (%asciz' EXCESSIVE'),
;          2082      WRD_23 = uplit (%asciz' MBUS'),
```

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;ML4
;
;
;          2083      WRD_24 = uplit (%asciz' DATA'),
;          2084      WRD_25 = uplit (%asciz' CONTINUITY'),
;          2085      WRD_26 = uplit (%asciz' AOE'),
;          2086      WRD_27 = uplit (%asciz' LBT'),
;          2087      WRD_29 = uplit (%asciz' PREMATURLY'),
;          2088      WRD_30 = uplit (%asciz' IAE'),
;          2089      WRD_31 = uplit (%asciz' INCREMENT'),
;          2090      WRD_32 = uplit (%asciz' WITH'),
;          2091      WRD_33 = uplit (%asciz' UV'),
;          2092      WRD_34 = uplit (%asciz' UNS'),
;          2093      WRD_35 = uplit (%asciz' PROM'),
;          2094      WRD_36 = uplit (%asciz' OR'),
;          2095      WRD_37 = uplit (%asciz' SELECT'),
;          2096      WRD_38 = uplit (%asciz' REG'),
;          2097      WRD_39 = uplit (%asciz' UNIQUE'),
;          2098      WRD_40 = uplit (%asciz' 14'),
;          2099      WRD_41 = uplit (%asciz' NIBBLE CNT'),
;          2100      WRD_42 = uplit (%asciz' GTR'),
;          2101      WRD_43 = uplit (%asciz' WHILE'),
;          2102      WRD_44 = uplit (%asciz' TRE'),
;          2103      WRD_45 = uplit (%asciz' INITIAL'),
;          2104      WRD_46 = uplit (%asciz' OFF SET'),
;          2105      WRD_47 = uplit (%asciz' COUNT'),
;          2106      WRD_48 = uplit (%asciz' DELAY'),
;          2107      WRD_49 = uplit (%asciz' TESTS'),
;          2108      WRD_50 = uplit (%asciz' ADRS'),
;          2109      WRD_51 = uplit (%asciz' COUNTER'),
;          2110      WRD_52 = uplit (%asciz' REG'),
;          2111      WRD_53 = uplit (%asciz' TESTED'),
;          2112      WRD_54 = uplit (%asciz' NIBBLE'),
;          2113      WRD_55 = uplit (%asciz' ALL'),
;          2114      WRD_56 = uplit (%asciz' TEST'),
;          2115      WRD_57 = uplit (%asciz' XFERED'),
;          2116      WRD_58 = uplit (%asciz' NIBBLES'),
;          2117      WRD_59 = uplit (%asciz' SC'),
;          2118      WRD_60 = uplit (%asciz' MULTIPLEXER'),
;          2119      WRD_61 = uplit (%asciz' UNEXPECTED'),
;          2120      WRD_62 = uplit (%asciz' NED'),
;          2121      WRD_63 = uplit (%asciz' ILR'),
;          2122      WRD_64 = uplit (%asciz' CRC'),
;          2123      WRD_65 = uplit (%asciz' SGL'),
;          2124      WRD_67 = uplit (%asciz' ECH'),
;          2125      WRD_68 = uplit (%asciz'UNC'),
;          2126      WRD_69 = uplit (%asciz' BIT'),
;          2127      WRD_70 = uplit (%asciz' CHANNEL'),
;          2128      WRD_71 = uplit (%asciz' LATCH'),
;          2129      WRD_72 = uplit (%asciz' DCK'),
;          2130      WRD_73 = uplit (%asciz' BUS'),
;          2131      WRD_74 = uplit (%asciz' SYNDRONE'),
;          2132      WRD_75 = uplit (%asciz' DECODE'),
;          2133      WRD_76 = uplit (%asciz' NOT'),
;          2134      WRD_77 = uplit (%asciz' UNCORRECTABLE'),
```

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;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (3)

;          2135      !
;          2136      ! PHRASES
;          2137      !
;          2138      PHR_1 = uplit (%asciz' BIT NOT SET'),
;          2139      PHR_2 = uplit (%asciz' BIT NOT CLR'),
;          2140      PHR_3 = uplit (%asciz' NO RESPONCE AFTER 1.5 US'),
;          2141      PHR_4 = uplit (%asciz' DATA ERRORS'),
;          2142      PHR_5 = uplit (%asciz' BIT SET'),
;          2143      PHR_6 = uplit (%asciz' BIT CLR'),
;          2144      PHR_7 = uplit (%asciz' OF OTHER DRIVES'),
;          2145      PHR_8 = uplit (%asciz' CLASS A'),
;          2146      PHR_9 = uplit (%asciz' CLASS B'),
;          2147      PHR_10 = uplit (%asciz' TO FIND'),
;          2148      PHR_11 = uplit (%asciz' NOT LATCHED'),
;          2149      PHR_12 = uplit (%asciz' SINGLE BIT ERROR'),
;          2150      PHR_13 = uplit (%asciz' MULTIPLE BIT ERROR'),
;          2151      PHR_14 = uplit (%asciz'          REGISTER   DUMP'),
;          2152      PHR_15 = uplit (%asciz'SERIAL #'),
;          2153      !
;          2154      ! FUNCTIONS
;          2155      !
;          2156      FNC_1 = uplit (%asciz' MEM SIZING'),
;          2157      FNC_2 = uplit (%asciz' NOOP'),
;          2158      FNC_3 = uplit (%asciz' DRV'),
;          2159      FNC_4 = uplit (%asciz' WRITE CHECK'),
;          2160      FNC_5 = uplit (%asciz' WRITE'),
;          2161      FNC_6 = uplit (%asciz' READ'),
;          2162      FNC_7 = uplit (%asciz' CLEAR'),
;          2163      FNC_8 = uplit (%asciz' COMP ERROR'),
;          2164      FNC_9 = uplit (%asciz' SYS CLR'),
;          2165      FNC_10 = uplit (%asciz' SEARCH'),
;          2166      FNC_11 = uplit (%asciz' READ-IN-PRESET'),
;          2167      FNC_12 = uplit (%asciz' ILLEGAL'),
;          2168      FNC_13 = uplit (%asciz' ABORT'),
;          2169      FNC_14 = uplit (%asciz' ARR RD WRT'),
;          2170      FNC_15 = uplit (%asciz' GOOD BLK'),
;          2171      FNC_16 = uplit (%asciz' REFRESH'),
;          2172      FNC_17 = uplit (%asciz' ARRAY'),
;          2173      FNC_18 = uplit (%asciz' RAM-BUS'),
;          2174      FNC_19 = uplit (%asciz' OVERFLOW'),
;          2175      FNC_21 = uplit (%asciz' CHK SUM'),
;          2176      FNC_22 = uplit (%asciz' LAST BLK'),
;          2177      FNC_23 = uplit (%asciz' INITIALIZE'),
;          2178      !
;          2179      ! REGISTERS
;          2180      !
;          2181      REG_1 = uplit (%asciz' MLCS1'),
;          2182      REG_2 = uplit (%asciz' MLDS'),
;          2183      REG_3 = uplit (%asciz' MLER'),
;          2184      REG_4 = uplit (%asciz' MLMR'),
;          2185      REG_5 = uplit (%asciz' MLAS'),
;          2186      REG_6 = uplit (%asciz' MLDA'),
```

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```
;ML4
;
;          2187      REG_7 = uplit (%asciz' MLDT'),
;          2188      REG_8 = uplit (%asciz' MLPA'),
;          2189      REG_9 = uplit (%asciz' MLSN'),
;          2190      REG_10 = uplit (%asciz' MLE1'),
;          2191      REG_11 = uplit (%asciz' MLE2'),
;          2192      REG_12 = uplit (%asciz' MLD1'),
;          2193      REG_13 = uplit (%asciz' MLD2'),
;          2194      REG_14 = uplit (%asciz' MLEE'),
;          2195      REG_15 = uplit (%asciz' MLEL'),
;          2196      REG_16 = uplit (%asciz' MLPD'),
;          2197      REG_17 = uplit (%asciz' MLCS2'),
;          2198      REG_18 = uplit (%asciz' MLWC'),
;          2199      REG_19 = uplit (%asciz' MLBA'),
;          2200      REG_20 = uplit (%asciz' MLBAI'),
;          2201      REG_21 = uplit (%asciz' MLCS3'),
;          2202      !
;          2203      ! MODULES IN ERROR MESSAGES
;          2204      !
;          2205      ASYNC = uplit (%asciz'ASYNCHRONOUS FAILURE MODULE 7361'),
;          2206      SYNC = uplit (%asciz'SYNCHRONOUS FAILURE MODULE 7362 '),
;          2207      ARR_DAT = uplit (%asciz'ARRAY DATA FAILURE MODULE 7363 '),
;          2208      MEM_ARR = uplit (%asciz'MEMORY ARRAY FAILURE MODULE 7357'),
;          2209      INTER = uplit (%asciz'INTERMEDIATE DIAGNOSTIC MESSAGE'),
;          2210      DATA_LATE = uplit (%asciz'DATA LATE ERROR DURING TRANSFER'),
;          2211      SC_SET = uplit (%asciz'SC BIT SET DURING TRANSFER'),
;          2212      TRBLE_LOOP = uplit (%asciz'TROUBLE SHOOT LOOP ERRORS'),
;          2213      RH_ERROR = uplit (%asciz'RH CONTROLLER ERRORS'),
;          2214      TIME_OUT = uplit (%asciz'DRIVE HUNG AFTER MASS BUS TRANSFER'),
;          2215  !
;          2216  ! DATA DIAGNOSTIC REGISTER SAVE LOCATIONS
;          2217  !
;          2218      D1_TEMP = NIB_SAVE,
;          2219      D2_TEMP = NIB_SAVE [1, 0, 16, 0],
;          2220      E2_TEMP = NIB_SAVE [2, 0, 16, 0];
;          2221
;          2222  !<BLF/PAGE>
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (5)

        2223  routine LOAD_STACK (STK_PTR, NIB_PTR) : novalue =
        2224      begin
        2225
        2226  !++
        2227  ! FUNCTIONAL DESCRIPTION:
        2228  !       LOAD STACK TAKES GOOD NIBBLE DATA
        2229  !       FOUND IN THE STRUCTURE 'NIB_SAVE'
        2230  !       AND STORES IT INTO THE STRUCTURE
        2231  !       'STACK' REWRITING ANY BAD NIBBLE
        2232  !       'STACK' LOCATIONS WITH GOOD NIBBLE
        2233  !       DATA
        2234  !
        2235  ! FORMAL PARAMETERS:
        2236  ! STK_PTR
        2237  !       POINTS TO PRESENT DEPTH OF THE
        2238  !       'STACK' WHERE PRESENT GOOD NIBBLE
        2239  !       DATA IS TO BE STORED.
        2240  !
        2241  ! NIB_PTR
        2242  !       POINTS TO CURRENT NIBBLE POSITION BEING
        2243  !       MANIPULATED.
        2244  !
        2245  ! IMPLICIT INPUTS:
        2246  ! STACK
        2247  !       VECTOR OF 198 BYTE LOCATIONS WHERE
        2248  !       GOOD NIBBLE DATA IS STORED
        2249  !       DURING DIAGNOSTIC MODE READS, AFTER
        2250  !       BAD NIBBLE LOCATIONS HAVE BEEN
        2251  !       STRIPPED AWAY.
        2252  !
        2253  ! STK_OFF
        2254  !
        2255  !    vector of 9 byte LOCATIONS WHICH
        2256  !       STORES AWAY A BAD NIBBLE OFF_SET
        2257  !       COUNT FOR EACH NIBBLE POSITION
        2258  !
        2259  ! NIB_SAVE
        2260  !       BLOCK OF 3 WORDS TO STORE THE
        2261  !       DATA FOUND IN MLD1, MLD2 AND
        2262  !       MLE2 AFTER A DIAGNOSTIC MODE READ.
        2263  !
        2264  ! IMPLICIT OUTPUTS:
        2265  !       'STACK' LOADED WITH GOOD NIBBLE
        2266  !       DATA
        2267  !
        2268  ! COMPLETETION CODES:   NONE
        2269  !
        2270  ! SIDE EFFECTS:        NONE
        2271  !
        2272  !--
        2273
        2274      case .NIB_PTR from 0 to 9 of                !SELECT NIBBLE DATA TO BE LOADED INTO THE STACK
```

```
855 ;ML4
856 ;
857
858 ;          2275          set
859 ;          2276
860 ;          2277          [0] :
861 ;          2278              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]));] = .NIB_SAVE [NIB_0];
862 ;          2279                                                  !LOAD NIBBLE DATA 0 INTO SELECTED STACK LOCATION
863 ;          2280
864 ;          2281          [1] :
865 ;          2282              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_1];
866 ;          2283                                                  !LOAD NIBBLE DATA 1 INTO SELECTED STACK LOCATION
867 ;          2284
868 ;          2285          [2] :
869 ;          2286              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_2];
870 ;          2287                                                  !LOAD NIBBLE DATA 2 INTO SELECTED STACK LOCATION
871 ;          2288
872 ;          2289          [3] :
873 ;          2290              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_3];
874 ;          2291                                                  !LOAD NIBBLE DATA 3 INTO SELECTED STACK LOCATION
875 ;          2292
876 ;          2293          [4] :
877 ;          2294              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_4];
878 ;          2295                                                  !LOAD NIBBLE DATA 4 INTO SELECTED STACK LOCATION
879 ;          2296
880 ;          2297          [5] :
881 ;          2298              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_5];
882 ;          2299                                                  !LOAD NIBBLE DATA 5 INTO SELECTED STACK LOCATION
883 ;          2300
884 ;          2301          [6] :
885 ;          2302              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_6];
886 ;          2303                                                  !LOAD NIBBLE DATA 6 INTO SELECTED STACK LOCATION
887 ;          2304
888 ;          2305          [7] :
889 ;          2306              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_7];
890 ;          2307                                                  !LOAD NIBBLE DATA 7 INTO SELECTED STACK LOCATION
891 ;          2308
892 ;          2309          [8] :
893 ;          2310              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_8];
894 ;          2311                                                  !LOAD NIBBLE DATA 8 INTO SELECTED STACK LOCATION
895 ;          2312
896 ;          2313          [9] :
897 ;          2314              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_9];
898 ;          2315                                                  !LOAD NIBBLE DATA 9 INTO SELECTED STACK LOCATION
899 ;          2316          tes;
900 ;          2317
901 ;          2318      end;
905
906
907
```

```
                                        ;ML4
                                        ;
                                P.AAA:  .ASCII  /%AE/
                                        .ASCII  /XPE/
                                        .ASCII  /CTE/
                                        .ASCII  /D: /
                                        .ASCII  /%06/
                                        .ASCII  /%A /
                                        .ASCII  /   /
                                        .ASCII  /REA/
                                        .ASCII  /D: /
                                        .ASCII  /%06/
                                        .ASCII  /%N%/
                                        .ASCII  /N/<00><00>
                                P.AAB:  .ASCII  /%AG/
                                        .ASCII  /OOD/
                                        .ASCII  / DA/
                                        .ASCII  /TA:/
                                        .ASCII  / %O/
                                        .ASCII  /6%A/
                                        .ASCII  /   /
                                        .ASCII  / BA/
                                        .ASCII  /D D/
                                        .ASCII  /ATA/
                                        .ASCII  /: %/
                                        .ASCII  /06%/
                                        .ASCII  /A  /
                                        .ASCII  /  X/
                                        .ASCII  /OR:/
                                        .ASCII  / %O/
                                        .ASCII  /6%N/
                                        .ASCII  /%N/<00>
                                P.AAC:  .ASCII  /%AD/
                                        .ASCII  /RIV/
                                        .ASCII  /E S/
                                        .ASCII  /N: /
                                        .ASCII  /%06/
                                        .ASCII  /%N%/
                                        .ASCII  /N/<00>
                                P.AAD:  .ASCII  /%AB/
                                        .ASCII  /IT /
                                        .ASCII  /IN /
                                        .ASCII  /ERR/
                                        .ASCII  /OR:/
                                        .ASCII  / %O/
                                        .ASCII  /6%N/
                                        .ASCII  /%N/<00>
                                P.AAE:  .ASCII  /%AG/
                                        .ASCII  /OOD/
                                        .ASCII  / NI/
                                        .ASCII  /B D/
                                        .ASCII  /ATA/
                                        .ASCII  /: %/
                                        .ASCII  /02%/
```

```
                                ;ML4
                                ;
004455  101  040  040          .ASCII  /A  /
004460  040  040  102          .ASCII  /  B/
004463  101  104  040          .ASCII  /AD /
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1723 010351  105  061  000          .ASCII  /E1/<00>
1724 010354  040  115  114  P.AGD:  .ASCII  / ML/
1725 010357  105  062  000          .ASCII  /E2/<00>
1726 010362  040  115  114  P.AGE:  .ASCII  / ML/
1727 010365  104  061  000          .ASCII  /D1/<00>
1728 010370  040  115  114  P.AGF:  .ASCII  / ML/
1729 010373  104  062  000          .ASCII  /D2/<00>
1730 010376  040  115  114  P.AGG:  .ASCII  / ML/
1731 010401  105  105  000          .ASCII  /EE/<00>
1732 010404  040  115  114  P.AGH:  .ASCII  / ML/
1733 010407  105  114  000          .ASCII  /EL/<00>
1734 010412  040  115  114  P.AGI:  .ASCII  / ML/
1735 010415  120  104  000          .ASCII  /PD/<00>
1736 010420  040  115  114  P.AGJ:  .ASCII  / ML/
1737 010423  103  123  062          .ASCII  /CS2/
1738 010426  000  000               .ASCII  <00><00>
1739 010430  040  115  114  P.AGK:  .ASCII  / ML/
1740 010433  127  103  000          .ASCII  /WC/<00>
1741 010436  040  115  114  P.AGL:  .ASCII  / ML/
1742 010441  102  101  000          .ASCII  /BA/<00>
1743 010444  040  115  114  P.AGM:  .ASCII  / ML/
1744 010447  102  101  111          .ASCII  /BAI/
1745 010452  000  000               .ASCII  <00><00>
1746 010454  040  115  114  P.AGN:  .ASCII  / ML/
1747 010457  103  123  063          .ASCII  /CS3/
```

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```
1749                                    ;ML4
1750                                    ;
1751
1752 010462  000  000                        .ASCII  <00><00>
1753 010464  101  123  131  P.AGO:           .ASCII  /ASY/
1754 010467  116  103  110                   .ASCII  /NCH/
1755 010472  122  117  116                   .ASCII  /RON/
1756 010475  117  125  123                   .ASCII  /OUS/
1757 010500  040  106  101                   .ASCII  / FA/
1758 010503  111  114  125                   .ASCII  /ILU/
1759 010506  122  105  040                   .ASCII  /RE /
1760 010511  115  117  104                   .ASCII  /MOD/
1761 010514  125  114  105                   .ASCII  /ULE/
1762 010517  040  067  063                   .ASCII  / 73/
1763 010522  066  061  000                   .ASCII  /61/<00>
1764 010525  000                             .ASCII  <00>
1765 010526  123  131  116  P.AGP:           .ASCII  /SYN/
1766 010531  103  110  122                   .ASCII  /CHR/
1767 010534  117  116  117                   .ASCII  /ONO/
1768 010537  125  123  040                   .ASCII  /US /
1769 010542  106  101  111                   .ASCII  /FAI/
1770 010545  114  125  122                   .ASCII  /LUR/
1771 010550  105  040  115                   .ASCII  /E M/
1772 010553  117  104  125                   .ASCII  /ODU/
1773 010556  114  105  040                   .ASCII  /LE /
1774 010561  067  063  066                   .ASCII  /736/
1775 010564  062  040  000                   .ASCII  /2 /<00>
1776 010567  000                             .ASCII  <00>
1777 010570  101  122  122  P.AGQ:           .ASCII  /ARR/
1778 010573  101  131  040                   .ASCII  /AY /
1779 010576  104  101  124                   .ASCII  /DAT/
1780 010601  101  040  106                   .ASCII  /A F/
1781 010604  101  111  114                   .ASCII  /AIL/
1782 010607  125  122  105                   .ASCII  /URE/
1783 010612  040  115  117                   .ASCII  / MO/
1784 010615  104  125  114                   .ASCII  /DUL/
1785 010620  105  040  067                   .ASCII  /E 7/
1786 010623  063  066  063                   .ASCII  /363/
1787 010626  040  000                        .ASCII  / /<00>
1788 010630  115  105  115  P.AGR:           .ASCII  /MEM/
1789 010633  117  122  131                   .ASCII  /ORY/
1790 010636  040  101  122                   .ASCII  / AR/
1791 010641  122  101  131                   .ASCII  /RAY/
1792 010644  040  106  101                   .ASCII  / FA/
1793 010647  111  114  125                   .ASCII  /ILU/
1794 010652  122  105  040                   .ASCII  /RE /
1795 010655  115  117  104                   .ASCII  /MOD/
1796 010660  125  114  105                   .ASCII  /ULE/
1797 010663  040  067  063                   .ASCII  / 73/
1798 010666  065  067  000                   .ASCII  /57/<00>
1799 010671  000                             .ASCII  <00>
1800 010672  111  116  124  P.AGS:           .ASCII  /INT/
1801 010675  105  122  115                   .ASCII  /ERM/
1802 010700  105  104  111                   .ASCII  /EDI/
1803 010703  101  124  105                   .ASCII  /ATE/
```

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```
1805                                ;ML4
1806                                ;
1807
1808 010706  040  104  111          .ASCII  / DI/
1809 010711  101  107  116          .ASCII  /AGN/
1810 010714  117  123  124          .ASCII  /OST/
1811 010717  111  103  040          .ASCII  /IC /
1812 010722  115  105  123          .ASCII  /MES/
1813 010725  123  101  107          .ASCII  /SAG/
1814 010730  105  000               .ASCII  /E/<00>
1815 010732  104  101  124  P.AGT:  .ASCII  /DAT/
1816 010735  101  040  114          .ASCII  /A L/
1817 010740  101  124  105          .ASCII  /ATE/
1818 010743  040  105  122          .ASCII  / ER/
1819 010746  122  117  122          .ASCII  /ROR/
1820 010751  040  104  125          .ASCII  / DU/
1821 010754  122  111  116          .ASCII  /RIN/
1822 010757  107  040  124          .ASCII  /G T/
1823 010762  122  101  116          .ASCII  /RAN/
1824 010765  123  106  105          .ASCII  /SFE/
1825 010770  122  000               .ASCII  /R/<00>
1826 010772  123  103  040  P.AGU:  .ASCII  /SC /
1827 010775  102  111  124          .ASCII  /BIT/
1828 011000  040  123  105          .ASCII  / SE/
1829 011003  124  040  104          .ASCII  /T D/
1830 011006  125  122  111          .ASCII  /URI/
1831 011011  116  107  040          .ASCII  /NG /
1832 011014  124  122  101          .ASCII  /TRA/
1833 011017  116  123  106          .ASCII  /NSF/
1834 011022  105  122  000          .ASCII  /ER/<00>
1835 011025  000                    .ASCII  <00>
1836 011026  124  122  117  P.AGV:  .ASCII  /TRO/
1837 011031  125  102  114          .ASCII  /UBL/
1838 011034  105  040  123          .ASCII  /E S/
1839 011037  110  117  117          .ASCII  /HOO/
1840 011042  124  040  114          .ASCII  /T L/
1841 011045  117  117  120          .ASCII  /OOP/
1842 011050  040  105  122          .ASCII  / ER/
1843 011053  122  117  122          .ASCII  /ROR/
1844 011056  123  000               .ASCII  /S/<00>
1845 011060  122  110  040  P.AGW:  .ASCII  /RH /
1846 011063  103  117  116          .ASCII  /CON/
1847 011066  124  122  117          .ASCII  /TRO/
1848 011071  114  114  105          .ASCII  /LLE/
1849 011074  122  040  105          .ASCII  /R E/
1850 011077  122  122  117          .ASCII  /RRO/
1851 011102  122  123  000          .ASCII  /RS/<00>
1852 011105  000                    .ASCII  <00>
1853 011106  104  122  111  P.AGX:  .ASCII  /DRI/
1854 011111  126  105  040          .ASCII  /VE /
1855 011114  110  125  116          .ASCII  /HUN/
1856 011117  107  040  101          .ASCII  /G A/
1857 011122  106  124  105          .ASCII  /FTE/
1858 011125  122  040  115          .ASCII  /R M/
1859 011130  101  123  123          .ASCII  /ASS/
```

```
1861                                    ;ML4
1862                                    ;
1863
1864 011133    040     102     125              .ASCII  / BU/
1865 011136    123     040     124              .ASCII  /S T/
1866 011141    122     101     116              .ASCII  /RAN/
1867 011144    123     106     105              .ASCII  /SFE/
1868 011147    122     000     000              .ASCII  /R/<00><00>
1869
1870
1871
1872 011152                                    NIB.SAVE:
1873 011152                                            .BLKW   3
1874 011160                                    HW.OR.TBL:
1875 011160                                            .BLKW   177
1876 011556                                    PTBL.PTR:
1877 011556                                            .BLKW   1
1878 011560                                    OP.NUM.ARR:
1879 011560                                            .BLKW   1
1880 011562                                    ARR.INC:.BLKW   1
1881 011564                                    GOOD.BLK:
1882 011564                                            .BLKW   1
1883 011566                                    PAR.DIS:.BLKW   1
1884 011570                                    CHIP.SIZ:
1885 011570                                            .BLKW   1
1886 011572                                    LST.BLK:.BLKW   1
1887 011574                                    ARR.16: .BLKW   1
1888 011576                                    LST.ARR:.BLKW   1
1889 011600                                    IO.BUF: .BLKW   400
1890 012600                                    STK.OFF:.BLKW   5
1891 012612                                    STACK:  .BLKW   143
1892 013120                                    PD.TEMP:.BLKW   1
1893 013122                                    W.C.SIZE:
1894 013122                                            .BLKW   1
1895 013124                                    RAS.INC:.BLKW   1
1896 013126                                    WT.DATA:.BLKW   1
1897 013130                                    RD.DATA:.BLKW   1
1898 013132                                    DRIVE.TYPE:
1899 013132                                            .BLKW   1
1900 013134                                    LST.DUT.REG:
1901 013134                                            .BLKW   1
1902 013136                                    REG.INIT.FLG:
1903 013136  000000                                    .WORD   0
1904 013140                                    A.CAL:  .BLKW   1
1905 013142                                    B.CAL:  .BLKW   1
1906 013144                                    P.CAL:  .BLKW   1
1907 013146                                    A.GEN:  .BLKW   1
1908 013150                                    B.GEN:  .BLKW   1
1909 013152                                    P.GEN:  .BLKW   1
1910 013154     000                            ML.REG: .BYTE   0
1911 013155     000                                    .BYTE   0
1912 013156  004000                                    .WORD   4000
1913 013160  173701                                    .WORD   -4077
1914 013162  160200                                    .WORD   -17600
```

```
1916                            ;ML4
1917                            ;
1918
1919 013164  000                       .BYTE   0
1920 013165  000                       .BYTE   0
1921 013166  000                       .BYTE   0
1922 013167  000                       .BYTE   0
1923 013170  000                       .BYTE   0
1924 013171  000                       .BYTE   0
1925 013172  000                       .BYTE   0
1926 013173  000                       .BYTE   0
1927 013174  000                       .BYTE   0
1928 013175  000                       .BYTE   0
1929 013176  000                       .BYTE   0
1930 013177  000                       .BYTE   0
1931 013200  000                       .BYTE   0
1932 013201  000                       .BYTE   0
1933 013202  000                       .BYTE   0
1934 013203  000                       .BYTE   0
1935 013204  000                       .BYTE   0
1936 013205  000                       .BYTE   0
1937 013206  000                       .BYTE   0
1938 013207  000                       .BYTE   0
1939 013210  000                       .BYTE   0
1940 013211  000                       .BYTE   0
1941 013212  000                       .BYTE   0
1942 013213  000                       .BYTE   0
1943 013214  000                       .BYTE   0
1944 013215  000                       .BYTE   0
1945 013216  000                       .BYTE   0
1946 013217  000                       .BYTE   0
1947 013220  000                       .BYTE   0
1948 013221  000                       .BYTE   0
1949 013222  000                       .BYTE   0
1950 013223  000                       .BYTE   0
1951 013224  000                       .BYTE   0
1952 013225  000                       .BYTE   0
1953 013226  010600                    .WORD   10600
1954 013230  025077                    .WORD   25077
1955 013232  000100                    .WORD   100
1956 013234  000                       .BYTE   0
1957 013235  000                       .BYTE   0
1958 013236  000                       .BYTE   0
1959 013237  000                       .BYTE   0
1960 013240  014620                    .WORD   14620
1961 013242  000                       .BYTE   0
1962 013243  000                       .BYTE   0
1963 013244  000                       .BYTE   0
1964 013245  000                       .BYTE   0
1965 013246  000                       .BYTE   0
1966 013247  000                       .BYTE   0
1967 013250  000                       .BYTE   0
1968 013251  000                       .BYTE   0
1969 013252  177400                    .WORD   -400
1970 013254  000                       .BYTE   0
```

```
1972                            ;ML4
1973                            ;
1974
1975  013255      000                       .BYTE   0
1976  013256      000                       .BYTE   0
1977  013257      000                       .BYTE   0
1978  013260   100000                       .WORD   -100000
1979  013262      000                       .BYTE   0
1980  013263      000                       .BYTE   0
1981  013264      000                       .BYTE   0
1982  013265      000                       .BYTE   0
1983  013266      000                       .BYTE   0
1984  013267      000                       .BYTE   0
1985  013270      000                       .BYTE   0
1986  013271      000                       .BYTE   0
1987  013272      000                       .BYTE   0
1988  013273      000                       .BYTE   0
1989  013274      000                       .BYTE   0
1990  013275      000                       .BYTE   0
1991  013276      000                       .BYTE   0
1992  013277      000                       .BYTE   0
1993  013300   000020                       .WORD   20
1994  013302   177400                       .WORD   -400
1995  013304      000                       .BYTE   0
1996  013305      000                       .BYTE   0
1997  013306   000110                       .WORD   110
1998  013310   177666                       .WORD   -112
1999  013312   000001                       .WORD   1
2000  013314      000                       .BYTE   0
2001  013315      000                       .BYTE   0
2002  013316      000                       .BYTE   0
2003  013317      000                       .BYTE   0
2004  013320      000                       .BYTE   0
2005  013321      000                       .BYTE   0
2006  013322      000                       .BYTE   0
2007  013323      000                       .BYTE   0
2008  013324      000                       .BYTE   0
2009  013325      000                       .BYTE   0
2010  013326      000                       .BYTE   0
2011  013327      000                       .BYTE   0
2012  013330   140300                       .WORD   -37500
2013  013332      000                       .BYTE   0
2014  013333      000                       .BYTE   0
2015  013334      000                       .BYTE   0
2016  013335      000                       .BYTE   0
2017  013336      000                       .BYTE   0
2018  013337      000                       .BYTE   0
2019  013340   100300                       .WORD   -77500
2020  013342      000                       .BYTE   0
2021  013343      000                       .BYTE   0
2022  013344      000                       .BYTE   0
2023  013345      000                       .BYTE   0
2024  013346      000                       .BYTE   0
2025  013347      000                       .BYTE   0
2026  013350      000                       .BYTE   0
```

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```
2028                            ;ML4
2029                            ;
2030
2031 013351   000                        .BYTE   0
2032 013352   000                        .BYTE   0
2033 013353   000                        .BYTE   0
2034 013354   000                        .BYTE   0
2035 013355   000                        .BYTE   0
2036 013356   000                        .BYTE   0
2037 013357   000                        .BYTE   0
2038 013360   000                        .BYTE   0
2039 013361   000                        .BYTE   0
2040 013362   000                        .BYTE   0
2041 013363   000                        .BYTE   0
2042 013364   000                        .BYTE   0
2043 013365   000                        .BYTE   0
2044 013366   000                        .BYTE   0
2045 013367   000                        .BYTE   0
2046 013370   010000                     .WORD   10000
2047 013372   000                        .BYTE   0
2048 013373   000                        .BYTE   0
2049 013374   000                        .BYTE   0
2050 013375   000                        .BYTE   0
2051 013376   000                        .BYTE   0
2052 013377   000                        .BYTE   0
2053 013400   000                        .BYTE   0
2054 013401   000                        .BYTE   0
2055 013402   000                        .BYTE   0
2056 013403   000                        .BYTE   0
2057 013404   000                        .BYTE   0
2058 013405   000                        .BYTE   0
2059 013406   000                        .BYTE   0
2060 013407   000                        .BYTE   0
2061 013410   000                        .BYTE   0
2062 013411   000                        .BYTE   0
2063 013412   000                        .BYTE   0
2064 013413   000                        .BYTE   0
2065 013414   000                        .BYTE   0
2066 013415   000                        .BYTE   0
2067 013416   000                        .BYTE   0
2068 013417   000                        .BYTE   0
2069 013420   000                        .BYTE   0
2070 013421   000                        .BYTE   0
2071 013422   000                        .BYTE   0
2072 013423   000                        .BYTE   0
2073 013424   000                        .BYTE   0
2074 013425   000                        .BYTE   0
2075 013426   000                        .BYTE   0
2076 013427   000                        .BYTE   0
2077 013430   000                        .BYTE   0
2078 013431   000                        .BYTE   0
2079 013432   000000                     .WORD   0
2080 013434   001001          REM.TBL:   .WORD   1001
2081 013436   004004                     .WORD   4004
2082 013440   020020                     .WORD   20020
```

```
                                ;ML4
                                ;
                                
013442  003003                          .WORD   3003
013444  014014                          .WORD   14014
013446  021460                          .WORD   21460
013450  005005                          .WORD   5005
013452  024024                          .WORD   24024
013454  023023                          .WORD   23023
013456  017017                          .WORD   17017
013460  035474                          .WORD   35474
013462  024465                          .WORD   24465
013464  021021                          .WORD   21021
013466  007007                          .WORD   7007
013470  034034                          .WORD   34034
013472  022463                          .WORD   22463
013474  011011                          .WORD   11011
013476  005444                          .WORD   5444
013500  026026                          .WORD   26026
013502  033033                          .WORD   33033
013504  016457                          .WORD   16457
013506  033472                          .WORD   33472
013510  014455                          .WORD   14455
013512  023462                          .WORD   23462
013514  015015                          .WORD   15015
013516  025464                          .WORD   25464
013520  025025                          .WORD   25025
013522  027027                          .WORD   27027
013524  037037                          .WORD   37037
013526  036477                          .WORD   36477
013530  030471                          .WORD   30471
013532     041                          .BYTE   41
                                        .EVEN
013534  064477                DT.1:     .WORD   64477
013536  007700                          .WORD   7700
013540     000                          .BYTE   0
013541     000                          .BYTE   0
013542  064477                          .WORD   64477
013544  000077                          .WORD   77
013546     000                          .BYTE   0
013547     000                          .BYTE   0
013550  100577                          .WORD   -77201
013552  017700                          .WORD   17700
013554     077                          .BYTE   77
013555     000                          .BYTE   0
013556  100577                          .WORD   -77201
013560  000000                          .WORD   0
013562     077                          .BYTE   77
013563     000                          .BYTE   0
013564  100577                          .WORD   -77201
013566  010077                          .WORD   10077
013570     077                          .BYTE   77
                                        .EVEN
013572                          RH.ADD: .BLKW   1
013574                          RH.TYP: .BLKW   1
```

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```
2140                            ;ML4
2141                            ;
2142
2143 013576                     RH.VEC: .BLKW   1
2144 013600                     ML.LUN: .BLKW   1
2145 013602                     ML.DUT: .BLKW   1
2146
2147
2148          100000            BIT15==             -100000
2149          040000            BIT14==             40000
2150          020000            BIT13==             20000
2151          010000            BIT12==             10000
2152          004000            BIT11==             4000
2153          002000            BIT10==             2000
2154          001000            BIT09==             1000
2155          000400            BIT08==             400
2156          000200            BIT07==             200
2157          000100            BIT06==             100
2158          000040            BIT05==             40
2159          000020            BIT04==             20
2160          000010            BIT03==             10
2161          000004            BIT02==             4
2162          000002            BIT01==             2
2163          000001            BIT00==             1
2164          001000            BIT9==              1000
2165          000400            BIT8==              400
2166          000200            BIT7==              200
2167          000100            BIT6==              100
2168          000040            BIT5==              40
2169          000020            BIT4==              20
2170          000010            BIT3==              10
2171          000004            BIT2==              4
2172          000002            BIT1==              2
2173          000001            BIT0==              1
2174          000040            EF.START==          40
2175          000037            EF.RESTART==        37
2176          000036            EF.CONTINUE==       36
2177          000035            EF.NEW==            35
2178          000034            EF.PWR==            34
2179          000340            PRI07==             340
2180          000300            PRI06==             300
2181          000240            PRI05==             240
2182          000200            PRI04==             200
2183          000140            PRI03==             140
2184          000100            PRI02==             100
2185          000040            PRI01==             40
2186          000000            PRI00==             0
2187          000004            EVL==               4
2188          000010            LOT==               10
2189          000020            ADR==               20
2190          000040            IDU==               40
2191          000100            ISR==               100
2192          000200            UAM==               200
2193          000400            BOE==               400
2194          001000            PNT==               1000
```

```
2196                    ;ML4
2197                    ;
2198
2199    002000          PRI==           2000
2200    004000          IXE==           4000
2201    010000          IBE==           10000
2202    020000          IER==           20000
2203    040000          LOE==           40000
2204    100000          HOE==           -100000
2205    004222          FMT.1=          P.AAA
2206    004266          FMT.2=          P.AAB
2207    004354          FMT.3=          P.AAC
2208    004400          FMT.4=          P.AAD
2209    004430          FMT.5=          P.AAE
2210    004532          FMT.6=          P.AAF
2211    004562          FMT.7=          P.AAG
2212    004610          FMT.8=          P.AAH
2213    C04644          FMT.9=          P.AAI
2214    004676          FMT.10=         P.AAJ
2215    004750          FMT.11=         P.AAK
2216    005004          FMT.12=         P.AAL
2217    005034          FMT.13=         P.AAM
2218    005110          FMT.14=         P.AAN
2219    005150          FMT.15=         P.AAO
2220    005216          FMT.16=         P.AAP
2221    005306          FMT.17=         P.AAQ
2222    005342          FMT.18=         P.AAR
2223    005412          FMT.19=         P.AAS
2224    005462          FMT.20=         P.AAT
2225    005534          FMT.21=         P.AAU
2226    005606          FMT.22=         P.AAV
2227    005652          FMT.23=         P.AAW
2228    005722          FMT.24=         P.AAX
2229    005746          FMT.25=         P.AAY
2230    005764          FMT.26=         P.AAZ
2231    006016          ONE.FMT=        P.ABA
2232    006024          TWO.FMT=        P.ABB
2233    006034          THR.FMT=        P.ABC
2234    006046          FOR.FMT=        P.ABD
2235    006062          FIV.FMT=        P.ABE
2236    006100          SIX.FMT=        P.ABF
2237    006120          SEV.FMT=        P.ABG
2238    006142          EIG.FMT=        P.ABH
2239    006166          NIN.FMT=        P.ABI
2240    006214          TEN.FMT=        P.ABJ
2241    006244          ELV.FMT=        P.ABK
2242    006276          WRD.1=          P.ABL
2243    006302          WRD.2=          P.ABM
2244    006314          WRD.3=          P.ABN
2245    006322          WRD.4=          P.ABO
2246    006330          WRD.5=          P.ABP
2247    006336          WRD.6=          P.ABQ
2248    006344          WRD.7=          P.ABR
2249    006360          WRD.8=          P.ABS
2250    006374          WRD.9=          P.ABT
```

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```
2252                            ;ML4
2253                            ;
2254
2255        006406              WRD.10=         P.ABU
2256        006416              WRD.11=         P.ABV
2257        006426              WRD.12=         P.ABW
2258        006436              WRD.13=         P.ABX
2259        006442              WRD.14=         P.ABY
2260        006454              WRD.15=         P.ABZ
2261        006462              WRD.16=         P.ACA
2262        006470              WRD.17=         P.ACB
2263        006502              WRD.18=         P.ACC
2264        006506              WRD.19=         P.ACD
2265        006514              WRD.20=         P.ACE
2266        006522              WRD.21=         P.ACF
2267        006530              WRD.22=         P.ACG
2268        006544              WRD.23=         P.ACH
2269        006552              WRD.24=         P.ACI
2270        006560              WRD.25=         P.ACJ
2271        006574              WRD.26=         P.ACK
2272        006602              WRD.27=         P.ACL
2273        006610              WRD.29=         P.ACM
2274        006624              WRD.30=         P.ACN
2275        006632              WRD.31=         P.ACO
2276        006646              WRD.32=         P.ACP
2277        006654              WRD.33=         P.ACQ
2278        006660              WRD.34=         P.ACR
2279        006666              WRD.35=         P.ACS
2280        006674              WRD.36=         P.ACT
2281        006700              WRD.37=         P.ACU
2282        006710              WRD.38=         P.ACV
2283        006716              WRD.39=         P.ACW
2284        006726              WRD.40=         P.ACX
2285        006732              WRD.41=         P.ACY
2286        006746              WRD.42=         P.ACZ
2287        006754              WRD.43=         P.ADA
2288        006764              WRD.44=         P.ADB
2289        006772              WRD.45=         P.ADC
2290        007004              WRD.46=         P.ADD
2291        007016              WRD.47=         P.ADE
2292        007026              WRD.48=         P.ADF
2293        007036              WRD.49=         P.ADG
2294        007046              WRD.50=         P.ADH
2295        007054              WRD.51=         P.ADI
2296        007066              WRD.52=         P.ADJ
2297        007074              WRD.53=         P.ADK
2298        007104              WRD.54=         P.ADL
2299        007114              WRD.55=         P.ADM
2300        007122              WRD.56=         P.ADN
2301        007130              WRD.57=         P.ADO
2302        007140              WRD.58=         P.ADP
2303        007152              WRD.59=         P.ADQ
2304        007156              WRD.60=         P.ADR
2305        007174              WRD.61=         P.ADS
2306        007210              WRD.62=         P.ADT
```

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```
2308                            ;ML4
2309                            ;
2310
2311    007216                  WRD.63=         P.ADU
2312    007224                  WRD.64=         P.ADV
2313    007232                  WRD.65=         P.ADW
2314    007240                  WRD.67=         P.ADX
2315    007246                  WRD.68=         P.ADY
2316    007252                  WRD.69=         P.ADZ
2317    007260                  WRD.70=         P.AEA
2318    007272                  WRD.71=         P.AEB
2319    007302                  WRD.72=         P.AEC
2320    007310                  WRD.73=         P.AED
2321    007316                  WRD.74=         P.AEE
2322    007330                  WRD.75=         P.AEF
2323    007340                  WRD.76=         P.AEG
2324    007346                  WRD.77=         P.AEH
2325    007366                  PHR.1=          P.AEI
2326    007404                  PHR.2=          P.AEJ
2327    007422                  PHR.3=          P.AEK
2328    007454                  PHR.4=          P.AEL
2329    007472                  PHR.5=          P.AEM
2330    007504                  PHR.6=          P.AEN
2331    007516                  PHR.7=          P.AEO
2332    007540                  PHR.8=          P.AEP
2333    007552                  PHR.9=          P.AEQ
2334    007564                  PHR.10=         P.AER
2335    007576                  PHR.11=         P.AES
2336    007614                  PHR.12=         P.AET
2337    007636                  PHR.13=         P.AEU
2338    007662                  PHR.14=         P.AEV
2339    007714                  PHR.15=         P.AEW
2340    007726                  FNC.1=          P.AEX
2341    007742                  FNC.2=          P.AEY
2342    007750                  FNC.3=          P.AEZ
2343    007756                  FNC.4=          P.AFA
2344    007774                  FNC.5=          P.AFB
2345    010004                  FNC.6=          P.AFC
2346    010012                  FNC.7=          P.AFD
2347    010022                  FNC.8=          P.AFE
2348    010036                  FNC.9=          P.AFF
2349    010050                  FNC.10=         P.AFG
2350    010060                  FNC.11=         P.AFH
2351    010100                  FNC.12=         P.AFI
2352    010112                  FNC.13=         P.AFJ
2353    010122                  FNC.14=         P.AFK
2354    010136                  FNC.15=         P.AFL
2355    010150                  FNC.16=         P.AFM
2356    010162                  FNC.17=         P.AFN
2357    010172                  FNC.18=         P.AFO
2358    010204                  FNC.19=         P.AFP
2359    010216                  FNC.21=         P.AFQ
2360    010230                  FNC.22=         P.AFR
2361    010242                  FNC.23=         P.AFS
2362    010256                  REG.1=          P.AFT
```

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```
2364                                    ;ML4
2365                                    ;
2366
2367        010266                      REG.2=          P.AFU
2368        010274                      REG.3=          P.AFV
2369        010302                      REG.4=          P.AFW
2370        010310                      REG.5=          P.AFX
2371        010316                      REG.6=          P.AFY
2372        010324                      REG.7=          P.AFZ
2373        010332                      REG.8=          P.AGA
2374        010340                      REG.9=          P.AGB
2375        010346                      REG.10=         P.AGC
2376        010354                      REG.11=         P.AGD
2377        010362                      REG.12=         P.AGE
2378        010370                      REG.13=         P.AGF
2379        010376                      REG.14=         P.AGG
2380        010404                      REG.15=         P.AGH
2381        010412                      REG.16=         P.AGI
2382        010420                      REG.17=         P.AGJ
2383        010430                      REG.18=         P.AGK
2384        010436                      REG.19=         P.AGL
2385        010444                      REG.20=         P.AGM
2386        010454                      REG.21=         P.AGN
2387        010464                      ASYNC=          P.AGO
2388        010526                      SYNC=           P.AGP
2389        010570                      ARR.DAT=        P.AGQ
2390        010630                      MEM.ARR=        P.AGR
2391        010672                      INTER=          P.AGS
2392        010732                      DATA.LATE=      P.AGT
2393        010772                      SC.SET=         P.AGU
2394        011026                      TRBLE.LOOP=     P.AGV
2395        011060                      RH.ERROR=       P.AGW
2396        011106                      TIME.OUT=       P.AGX
2397        011152                      D1.TEMP=        NIB.SAVE
2398        011154                      D2.TEMP=        NIB.SAVE+2
2399        011156                      E2.TEMP=        NIB.SAVE+4
2400
2401
2402                                            .SBTTL  LOAD.STACK
2403
2407  013604                            LOAD.STACK:
2408  013604  004167  170250                    JSR     R1,$SAVE3               ;                                       2223
2409  013610  016601  000012                    MOV     12(SP),R1               ; NIB.PTR,*                             2278
2410  013614  012702  012600                    MOV     #STK.OFF,R2
2411  013620  060102                            ADD     R1,R2
2412  013622  016601  000014                    MOV     14(SP),R1               ; STK.PTR,*
2413  013626  016600  000012                    MOV     12(SP),R0               ; NIB.PTR,*                             2274
2414  013632  006300                            ASL     R0
2415  013634  066007  013640                    ADD     1$(R0),PC
2416  013640  000024                    1$:     .WORD   2$-1$
2417  013642  000042                            .WORD   3$-1$
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                .WORD   4$-1$
                                .WORD   5$-1$
                                .WORD   6$-1$
                                .WORD   7$-1$
                                .WORD   9$-1$
                                .WORD   10$-1$
                                .WORD   12$-1$
                                .WORD   15$-1$
                        2$:     CLR     R3                              ;               2278
                                BISB    (R2),R3
                                MOV     R1,R0
                                SUB     R3,R0
                                MOV     NIB.SAVE,R3
                                BR      14$
                        3$:     CLR     R3                              ;               2282
                                BISB    (R2),R3
                                MOV     R1,R0
                                SUB     R3,R0
                                MOV     NIB.SAVE,R3
                                BR      8$
                        4$:     CLR     R3                              ;               2286
                                BISB    (R2),R3
                                MOV     R1,R0
                                SUB     R3,R0
                                MOV     NIB.SAVE,R3
                                BR      13$
                        5$:     CLR     R3                              ;               2290
                                BISB    (R2),R3
                                MOV     R1,R0
                                SUB     R3,R0
                                MOV     NIB.SAVE,R3
                                BR      11$
                        6$:     CLR     R3                              ;               2294
                                BISB    (R2),R3
                                MOV     R1,R0
                                SUB     R3,R0
                                MOV     NIB.SAVE+2,R3
                                BR      14$
                        7$:     CLR     R3                              ;               2298
                                BISB    (R2),R3
                                MOV     R1,R0
                                SUB     R3,R0
                                MOV     NIB.SAVE+2,R3
                        8$:     ASR     R3
                                ASR     R3
                                ASR     R3
                                ASR     R3
                                BR      14$
                        9$:     CLR     R3                              ;               2302
                                BISB    (R2),R3
                                MOV     R1,R0
                                SUB     R3,R0
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                MOV     NIB.SAVE+2,R3
                                                BR      13$
                                10$:    CLR     R3                              ;                                       2306
                                        BISB    (R2),R3
                                        MOV     R1,R0
                                        SUB     R3,R0
                                        MOV     NIB.SAVE+2,R3
                                11$:    ASR     R3
                                        ASR     R3
                                        ASR     R3
                                        ASR     R3
                                        BR      13$
                                12$:    CLR     R3                              ;                                       2310
                                        BISB    (R2),R3
                                        MOV     R1,R0
                                        SUB     R3,R0
                                        MOV     NIB.SAVE+4,R3
                                13$:    SWAB    R3
                                14$:    BIC     #177760,R3
                                        CLRB    STACK(R0)
                                        BISB    R3,STACK(R0)
                                        RTS     PC                              ;                                       2274
                                15$:    CLR     R3                              ;                                       2314
                                        BISB    (R2),R3
                                        SUB     R3,R1
                                        MOV     NIB.SAVE+4,R3
                                        ASR     R3
                                        ASR     R3
                                        ASR     R3
                                        ASR     R3
                                        SWAB    R3
                                        BIC     #177770,R3
                                        CLRB    STACK(R1)
                                        BISB    R3,STACK(R1)
                                        RTS     PC                              ;                                       2223

                                ; Routine Size:  119 words
                                ; Maximum stack depth per invocation:  4 words
```

```
2523 ;ML4                                                          14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
2524 ;                                                             14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (6)
2525
2526 ;          2319  routine DAT_DM_XFER : novalue =
2527 ;          2320
2528 ;          2321  !++
2529 ;          2322  ! FUNCTIONAL DESCRIPTION:
2530 ;          2323  !
2531 ;          2324  !       A REPEATEDLY CALLED SEQUENCE
2532 ;          2325  !       OF ASSIGNMENT EXPRESSIONS TO
2533 ;          2326  !       LOAD THE DSA, BUS ADRS  AND WORD
2534 ;          2327  !       COUNT REGISTERS WITH APPROPRIATE
2535 ;          2328  !       INFORMATION BEFORE A MASS BUS
2536 ;          2329  !       TRANSFER CAN COMMENCE
2537 ;          2330  !
2538 ;          2331  !       LOADS A MASS BUS BLOCK TRANSFER,
2539 ;          2332  !       IN DIAGNOSTIC MODE, AT THE GOOD
2540 ;          2333  !       BLOCK ADRS.
2541 ;          2334  !
2542 ;          2335  !--
2543 ;          2336
2544 ;          2337      begin
2545 ;          2338      DAT_DM = ONE;                    !SET DATA DIAG MODE
2546 ;          2339      MLDA = .GOOD_BLK;                !LOAD DSA REG WITH THE GOOD BLOCK ADRS
2547 ;          2340      MLBA = IO_BUF;                   !LOAD BUS ADRS REG WITH THE IO_BUF ADRS
2548 ;          2341      MLWC = not 255;                  !LOAD WORD COUNT REG WITH COMPLIMENT 256
2549 ;          2342      end;
2553
2554                                    .SBTTL  DAT.DM.XFER
2558 014162                        DAT.DM.XFER:
2559 014162  152777  000010  177104          BISB    #10,@ML.REG+120          ;                    2338
2560 014170  016777  175370  177006          MOV     GOOD.BLK,@ML.REG+30      ;                    2339
2561 014176  012777  011600  176770          MOV     #IO.BUF,@ML.REG+20       ;                    2340
2562 014204  012777  177400  176752          MOV     #-400,@ML.REG+10         ;                    2341
2563 014212  000207                          RTS     PC                       ;                    2319
2564
2565                                    ; Routine Size:  13 words
2566                                    ; Maximum stack depth per invocation:  0 words
2571
2572
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (7)

;          2343  routine STRIPPER (WRD_CNT, NIB_CNT) : novalue =
;          2344      begin
;          2345
;          2346  !++
;          2347  ! FUNCTIONAL DESCRIPTION:
;          2348  !       STRIPPER RUNS IN DATA DIAG MODE AND STRIPS OUT
;          2349  !       A VARIABLE NUMBER OF GOOD NIBBLES FROM THE
;          2350  !       GOOD BLOCK AND STORES THEM INTO A CONTIGIOUS
;          2351  !       STACK FOR SEQUENTIAL ACCESSING
;          2352  !
;          2353  ! FORMAL PARAMETERS:
;          2354  !       WRD_CNT
;          2355  !       TELLS STRIPPER HOW MANY WORDS IN THE GOOD
;          2356  !       BLOCK TO READ OUT
;          2357  !
;          2358  !       NIB_CNT
;          2359  !       TELLS STRIPPER HOW MANY NIBBLES TO
;          2360  !       STRIP OUT OF EACH WORD.
;          2361  !
;          2362  ! IMPLICIT INPUTS:
;          2363  !--
;          2364
;          2365      local
;          2366          STK_PTR;                                !STACK POINTER
;          2367
;          2368      incr CNT from 0 to .NIB_CNT do              !CLEAR OUT THE STACK OFFSETS
;          2369          STK_OFF [.CNT] = ZEROES;
;          2370
;          2371      CLR_MBUS;
;          2372      STK_PTR = -1;                               !RESET THE STACK POINTER
;          2373      DAT_DM_XFER ();                             !SET UP A DATA XFER AT THE GOOD BLOCK
;          2374      MLCS1 = read;                               !DO A READ XFER
;          2375      DELAY (ONE_US);                             !ALLOW PROM DATA TO GET INTO THE MLPD REG
;          2376
;          2377      incr CNT from 0 to .WRD_CNT do              !LOAD THE STACK WITH ALL GOOD NIBBLE DATA
;          2378          begin
;          2379          PD_TEMP = .MLPD;                        !GET THE PROM DATA
;          2380          DAT_CLK = ONE;                          !CLOCK OUT THE DATA WORD
;          2381          DELAY (ONE_US);                         !
;          2382          RD_LNG_WRD;                             !READ DATA DIAG REGS INTO NIBBLE SAVE
;          2383
;          2384          incr NIB_PTR from 0 to .NIB_CNT do      !STRIP OUT X NUMBER OF NIBBLES
;          2385              begin
;          2386              STK_PTR = .STK_PTR + 1;             !INCREMENT THE STACK POINTER
;          2387
;          2388              if .PD_TEMP [.NIB_PTR] IS_SET       !SEE IF THIS A GOOD NIBBLE
;          2389              then
;          2390                  STK_OFF [.NIB_PTR] = (.STK_OFF [.NIB_PTR]) + (.NIB_CNT + 1)
;          2391                                                  !THEN INCREMENT IT'S STACK OFFSET
;          2392              else
;          2393                  LOAD_STACK (.STK_PTR, .NIB_PTR);        !ELSE LOAD THE NIBBLE IN THE STACK
;          2394
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (7)
```

```
                                2631
                                2632 ;          2395              end;
                                2633 ;          2396
                                2634 ;          2397          end;
                                2635 ;          2398
                                2636 ;          2399      CLR_MBUS;
                                2637 ;          2400      end;
                                2641
                                2642                              .GLOBL  L$DLY
                                2643
                                2644
                                2645                              .SBTTL  STRIPPER
2649 014214                                     STRIPPER:
2650 014214  004167  167676                      JSR     R1,$SAVE5                ;                                        2343
2651 014220  005746                              TST     -(SP)
2652 014222  016604  000020                      MOV     20(SP),R4                ; NIB.CNT,*                              2368
2653 014226  005001                              CLR     R1                       ; CNT
2654 014230  000403                              BR      2$
2655 014232  105061  012600              1$:     CLRB    STK.OFF(R1)              ; *(CNT)                                 2369
2656 014236  005201                              INC     R1                       ; CNT                                    2368
2657 014240  020104              2$:             CMP     R1,R4                    ; CNT,*
2658 014242  003773                              BLE     1$
2659 014244  152777  000040  176742              BISB    #40,@ML.REG+40           ;                                        2369
2660 014252  016705  177324                      MOV     ML.DUT,R5
2661 014256  042705  177770                      BIC     #177770,R5
2662 014262  142777  000007  176724              BICB    #7,@ML.REG+40
2663 014270  150577  176720                      BISB    R5,@ML.REG+40
2664 014274  012705  177777                      MOV     #-1,R5                   ; *,STK.PTR                              2372
2665 014300  004767  177656                      JSR     PC,DAT.DM.XFER           ;                                        2373
2666 014304  012777  000071  176642              MOV     #71,@ML.REG              ;                                        2374
2667 014312  012701  000001                      MOV     #1,R1                    ; *,$$TMP2                               2375
2668 014316  001410              3$:             BEQ     6$
2669 014320  016702  165572                      MOV     L$DLY,R2                 ; *,$$TMP1
2670 014324  001403                              BEQ     5$
2671 014326  005016              4$:             CLR     (SP)                     ; $$TMP
2672 014330  005302                              DEC     R2                       ; $$TMP1
2673 014332  001375                              BNE     4$
2674 014334  005301              5$:             DEC     R1                       ; $$TMP2
2675 014336  000767                              BR      3$
2676 014340  005003              6$:             CLR     R3                       ; CNT                                    2377
2677 014342  000502                              BR      16$
2678 014344  017767  177034  176546  7$:         MOV     @ML.REG+230,PD.TEMP      ;                                        2379
2679 014352  152777  000020  176714              BISB    #20,@ML.REG+120          ;                                        2380
2680 014360  012701  000001                      MOV     #1,R1                    ; *,$$TMP2                               2381
2681 014364  001410              8$:             BEQ     11$
2682 014366  016702  165524                      MOV     L$DLY,R2                 ; *,$$TMP1
2683 014372  001403                              BEQ     10$
2684                            ;ML4                                                      14-May-1981 13:48:54    TOPS
2685                            ;                                                         14-May-1981 13:05:08    PA:<
2686
2687 014374  005016              9$:             CLR     (SP)                     ; $$TMP
2688 014376  005302                              DEC     R2                       ; $$TMP1
2689 014400  001375                              BNE     9$
2690 014402  005301              10$:            DEC     R1                       ; $$TMP2
2691 014404  000767                              BR      8$
2692 014406  017767  176732  174536  11$:        MOV     @ML.REG+170,D1.TEMP
2693 014414  017767  176734  174532              MOV     @ML.REG+200,D2.TEMP
```

```
2694 014422  017767  176706  174526          MOV     @ML.REG+160,E2.TEMP
2695 014430  005002                          CLR     R2                      ; NIB.PTR                       2384
2696 014432  000443                          BR      15$
2697 014434  005205                  12$:    INC     R5                      ; STK.PTR                       2386
2698 014436  010201                          MOV     R2,R1                   ; NIB.PTR,*                     2388
2699 014440  006201                          ASR     R1
2700 014442  006201                          ASR     R1
2701 014444  006201                          ASR     R1
2702 014446  062701  013120                  ADD     #PD.TEMP,R1
2703 014452  010146                          MOV     R1,-(SP)
2704 014454  010246                          MOV     R2,-(SP)                ; NIB.PTR,*
2705 014456  042716  177770                  BIC     #177770,(SP)
2706 014462  012746  000001                  MOV     #1,-(SP)
2707 014466  005046                          CLR     -(SP)
2708 014470  004767  166444                  JSR     PC,BL$GT2
2709 014474  062706  000010                  ADD     #10,SP
2710 014500  005300                          DEC     R0
2711 014502  001011                          BNE     13$
2712 014504  005001                          CLR     R1                      ;                               2390
2713 014506  156201  012600                  BISB    STK.OFF(R2),R1          ; *(NIB.PTR),*
2714 014512  060401                          ADD     R4,R1
2715 014514  010100                          MOV     R1,R0
2716 014516  005200                          INC     R0
2717 014520  110062  012600                  MOVB    R0,STK.OFF(R2)          ; *,*(NIB.PTR)
2718 014524  000405                          BR      14$                     ;                               2388
2719 014526  010546                  13$:    MOV     R5,-(SP)                ; STK.PTR,*                     2393
2720 014530  010246                          MOV     R2,-(SP)                ; NIB.PTR,*
2721 014532  004767  177046                  JSR     PC,LOAD.STACK
2722 014536  022626                          CMP     (SP)+,(SP)+
2723 014540  005202                  14$:    INC     R2                      ; NIB.PTR                       2384
2724 014542  020204                  15$:    CMP     R2,R4                   ; NIB.PTR,*
2725 014544  003733                          BLE     12$
2726 014546  005203                          INC     R3                      ; CNT                           2377
2727 014550  020366  000022          16$:    CMP     R3,22(SP)               ; CNT,WRD.CNT
2728 014554  003673                          BLE     7$
2729 014556  152777  000040  176430          BISB    #40,@ML.REG+40          ;                               2397
2730 014564  016705  177012                  MOV     ML.DUT,R5
2731 014570  042705  177770                  BIC     #177770,R5
2732 014574  142777  000007  176412          BICB    #7,@ML.REG+40
2733 014602  150577  176406                  BISB    R5,@ML.REG+40
2734 014606  005726                          TST     (SP)+                   ;                               2343
2735 014610  000207                          RTS     PC
2736
2737                                 ; Routine Size:  127 words
2738                                 ; Maximum stack depth per invocation:  11 words
2739                                 ;ML4                                    14-May-1981 13:48:54    TOPS
2740                                 ;                                       14-May-1981 13:05:08    PA:<
2741
2746
2747
```

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;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (8)

        2401  routine CAL_CRC : novalue =
        2402      begin
        2403
        2404  !++
        2405  ! FUNCTIONAL DESCRIPTION:
        2406  !       CALCULATE THE CRC CODE FOR THE GOOD BLOCKS
        2407  !       FIRST CRC GROUP (60 NIBBLES) BY STRIPPING
        2408  !       OUT GOOD NIBBLES AND MODULO 2 ADDING EACH
        2409  !       BITS WEIGHT RESULTING IN A_CAL,B_CAL,P_CAL.
        2410  !
        2411  ! IMPLICIT INPUTS:
        2412  !       P_CAL,A_CAL,B_CAL
        2413  !       GOLBAL STORAGE LOCATION WHERE CALCULATED
        2414  !       CRC CODES ARE STORED AND EXAMINED FROM
        2415  !
        2416  !       REM_TBL
        2417  !       TABLE CONTAINING PRECALCULATED BIT POSITION
        2418  !       WEIGHTS USED IN THE MODULO 2 CALCULATION OF THE
        2419  !       CRC CODE
        2420  !--
        2421
        2422      local
        2423          CHANNEL,                          !CHANNEL POINTS TO THE BITS IN A WORD
        2424          STK_PTR,                          !STACK POINTER
        2425          NIB_SAV : bitvector [4],          !NIBBLE SAVE LOCATION
        2426          ALOG,                             !INDEX INTO REMAINDER TABLE
        2427          BLOG;                             !INDEX INTO REMAINDER TABLE
        2428
        2429      STRIPPER (12, 9);                     !STRIP OUT ALL 10 NIBBLE FROM 13 ARRAY WORDS
        2430      STK_PTR = -1;                         !RESET STACK POINTER
        2431
        2432      incr PLOG from 0 to 5 do              !PLOG POINTS TO ONE CRC GROUP '6 WORDS'
        2433          begin
        2434          CHANNEL = -1;                     !RESET CHANNEL FOR EACH WORD
        2435
        2436          incr NIB_CNT from 0 to 8 do       !READ DATA NIBBLE 0-8 AND CALCULATE CRC
        2437              begin
        2438              STK_PTR = .STK_PTR + 1;       !INCREMENT THE STACK POINTER
        2439              NIB_SAV = .stack [.STK_PTR];  !LOAD NIV_SAV WITH A STACK NIBBLE
        2440
        2441              incr BIT_TST from 0 to 3 do   !TEST THE BIT FOR BEING SET
        2442                  begin
        2443                  CHANNEL = .CHANNEL + 1;   !CHANNEL POINTS TO THIS BIT
        2444
        2445                  if .NIB_SAV [.BIT_TST] IS_SET   !SEE IF THIS BIT IS SET
        2446                  then
        2447                      begin                 !IF SET THEN MOD 2 ADD THE REMAINDER
        2448                      ALOG = .PLOG + .CHANNEL;    !CALCULATE THE ALOG
        2449                      BLOG = .PLOG + .CHANNEL*2;  !CALCULATE THE BLOG
        2450
        2451                      while .ALOG geq 63 do       !REDUCE ALOG UNTIL < 64
        2452                          ALOG = .ALOG - 63;
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (8)
```

```
                                2453
                                2454                    while .BLOG geq 63 do       !REDUCE BLOG UNTIL <64
                                2455                        BLOG = .BLOG - 63;
                                2456
                                2457                    P_CAL = (.P_CAL) xor (.REM_TBL [.PLOG]);     !MOD 2 P_CAL WITH REM_TBL
                                2458                    A_CAL = (.A_CAL) xor (.REM_TBL [.ALOG]);     !MOD 2 A_CAL WITH REM_TBL
                                2459                    B_CAL = (.B_CAL) xor (.REM_TBL [.BLOG]);     !MOD 2 B_CAL WITH REM_TBL
                                2460                    end;
                                2461
                                2462                end;
                                2463
                                2464            end;
                                2465
                                2466            STK_PTR = .STK_PTR + 1;                 !SKIP OVER THE CRC NIB NT THE STACK
                                2467            end;
                                2468
                                2469        end;
                                2827
                                2828                            .SBTTL  CAL.CRC
014612  004167  167300          2832  CAL.CRC:  JSR     R1,$SAVE5                       ;                                   2401
014616  162706  000012          2833            SUB     #12,SP
014622  012746  000014          2834            MOV     #14,-(SP)                       ;                                   2429
014626  012746  000011          2835            MOV     #11,-(SP)
014632  004767  177356          2836            JSR     PC,STRIPPER
014636  012766  177777  000006  2837            MOV     #-1,6(SP)                       ; *,STK.PTR                         2430
014644  005066  000004          2838            CLR     4(SP)                           ; PLOG                              2432
014650  012766  177777  000010  2839    1$:     MOV     #-1,10(SP)                      ; *,CHANNEL                         2434
014656  005066  000012          2840            CLR     12(SP)                          ; NIB.CNT                           2436
014662  005266  000006          2841    2$:     INC     6(SP)                           ; STK.PTR                           2438
014666  016605  000006          2842            MOV     6(SP),R5                        ; STK.PTR,*                         2439
014672  116566  012612  000014  2843            MOVB    STACK(R5),14(SP)                ; *,NIB.SAV
014700  105066  000015          2844            CLRB    15(SP)                          ; NIB.SAV
014704  005003                  2845            CLR     R3                              ; BIT.TST                           2441
014706  005266  000010          2846    3$:     INC     10(SP)                          ; CHANNEL                           2443
014712  010305                  2847            MOV     R3,R5                           ; BIT.TST,*                         2445
014714  006205                  2848            ASR     R5
014716  006205                  2849            ASR     R5
014720  006205                  2850            ASR     R5
014722  012704  000014          2851            MOV     #14,R4
014726  060604                  2852            ADD     SP,R4                           ; NIB.SAV,*
014730  060405                  2853            ADD     R4,R5
014732  010546                  2854            MOV     R5,-(SP)
014734  010346                  2855            MOV     R3,-(SP)                        ; BIT.TST,*
014736  042716  177770          2856            BIC     #177770,(SP)
014742  012746  000001          2857            MOV     #1,-(SP)
014746  005046                  2858            CLR     -(SP)
                                2859    ;ML4                                                    14-May-1981 13:48:54    TOPS
                                2860    ;                                                       14-May-1981 13:05:08    PA:<
                                2861
014750  004767  166164          2862            JSR     PC,BL$GT2
014754  062706  000010          2863            ADD     #10,SP
014760  005300                  2864            DEC     R0
014762  001066                  2865            BNE     7$
014764  016601  000004          2866            MOV     4(SP),R1                        ; PLOG,ALOG                         2448
014770  066601  000010          2867            ADD     10(SP),R1                       ; CHANNEL,ALOG
014774  016605  000010          2868            MOV     10(SP),R5                       ; CHANNEL,*                         2449
```

```
 2869 015000  006305                    ASL     R5
 2870 015002  066605  000004            ADD     4(SP),R5                ; PLOG,*
 2871 015006  010502                    MOV     R5,R2                   ; *,BLOG
 2872 015010  020127  000077      4$:   CMP     R1,#77                  ; ALOG,*                2451
 2873 015014  002403                    BLT     5$
 2874 015016  162701  000077            SUB     #77,R1                  ; *,ALOG                2452
 2875 015022  000772                    BR      4$                      ;                       2451
 2876 015024  020227  000077      5$:   CMP     R2,#77                  ; BLOG,*                2454
 2877 015030  002403                    BLT     6$
 2878 015032  162702  000077            SUB     #77,R2                  ; *,BLOG                2455
 2879 015036  000772                    BR      5$                      ;                       2454
 2880 015040  005005              6$:   CLR     R5                      ;                       2457
 2881 015042  016604  000004            MOV     4(SP),R4                ; PLOG,*
 2882 015046  156405  013434            BISB    REM.TBL(R4),R5
 2883 015052  010546                    MOV     R5,-(SP)
 2884 015054  046716  176064            BIC     P.CAL,(SP)
 2885 015060  040567  176060            BIC     R5,P.CAL
 2886 015064  052667  176054            BIS     (SP)+,P.CAL
 2887 015070  005005                    CLR     R5                      ;                       2458
 2888 015072  156105  013434            BISB    REM.TBL(R1),R5          ; *(ALOG),*
 2889 015076  010504                    MOV     R5,R4
 2890 015100  046704  176034            BIC     A.CAL,R4
 2891 015104  040567  176030            BIC     R5,A.CAL
 2892 015110  050467  176024            BIS     R4,A.CAL
 2893 015114  005005                    CLR     R5                      ;                       2459
 2894 015116  156205  013434            BISB    REM.TBL(R2),R5          ; *(BLOG),*
 2895 015122  010504                    MOV     R5,R4
 2896 015124  046704  176012            BIC     B.CAL,R4
 2897 015130  040567  176006            BIC     R5,B.CAL
 2898 015134  050467  176002            BIS     R4,B.CAL
 2899 015140  005203              7$:   INC     R3                      ; BIT.TST               2441
 2900 015142  020327  000003            CMP     R3,#3                   ; BIT.TST,*
 2901 015146  003657                    BLE     3$
 2902 015150  005266  000012            INC     12(SP)                  ; NIB.CNT               2436
 2903 015154  026627  000012  000010    CMP     12(SP),#10              ; NIB.CNT,*
 2904 015162  003637                    BLE     2$
 2905 015164  005266  000006            INC     6(SP)                   ; STK.PTR               2466
 2906 015170  005266  000004            INC     4(SP)                   ; PLOG                  2432
 2907 015174  026627  000004  000005    CMP     4(SP),#5                ; PLOG,*
 2908 015202  003622                    BLE     1$
 2909 015204  062706  000016            ADD     #16,SP                  ;                       2401
 2910 015210  000207                    RTS     PC
 2911
 2912                           ; Routine Size:  128 words
 2913                           ; Maximum stack depth per invocation:  17 words
 2914                           ;ML4                                    14-May-1981 13:48:54    TOPS
 2915                           ;                                       14-May-1981 13:05:08    PA:<
 2916
 2921
 2922
```

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;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (9)

;          2470  routine ERR_CHK_CRC =
;          2471      begin
;          2472
;          2473  !++
;          2474  ! FUNCTIONAL DESCRIPTION:
;          2475  !       'ERROR CHECK CRC' COMPARES HARDWARE GENERATED CRC
;          2476  !       CODES TO SOFTWARE CALCULATED CRC CODE FOR ONE
;          2477  !       CRC GROUP AND RETURNS A ONE ON DETECTION OF ERRORS
;          2478  !
;          2479  ! IMPLICIT INPUTS:
;          2480  !       P_CAL,A_CAL,B_CAL
;          2481  !       GLOBAL STORAGE LOCATIONS WHERE CALCULATED
;          2482  !       CRC CODES ARE STORED AND EXAMINED FROM
;          2483  !
;          2484  !       P_GEN,A_GEN,B_GEN
;          2485  !       GLOBAL STROAGE LOCATIONS WHERE HARDWARE GENERATED
;          2486  !       CRC CODES ARE STORED AND EXAMINED FROM
;          2487  !--
;          2488
;          2489      local
;          2490          POS,                                    !VARIABLE FOR FIELD SELECTOR
;          2491          TEMP;                                   !TEMPORARY STORAGE LOCATION
;          2492
;          2493      POS = -1;                                   !RESET THE POS
;          2494
;          2495      incr STK_PTR from 9 to 59 by 10 do          !CONVERT VERTICAL STACK CRC TO HORIZONTAL REPRESENTATION
;          2496          begin
;          2497          POS = .POS + 1;                         !INCREMENT POS
;          2498          TEMP = .stack [.STK_PTR];               !READ CRC NIB FROM THE STACK
;          2499          (P_GEN)<.POS, 1> = .TEMP<0, 1>;         !CONVERT 1ST BIT
;          2500          (A_GEN)<.POS, 1> = not .TEMP<1, 1>;     !CONVERT 2ND BIT
;          2501          (B_GEN)<.POS, 1> = not .TEMP<2, 1>;     !CONVERT 3ED BIT
;          2502          end;
;          2503
;          2504      if (.P_GEN neq .P_CAL) or (.A_GEN neq .A_CAL) or (.B_GEN neq .B_CAL) then return ONE else return ZERO;
;          2505
;          2506                                                  !COMPARE GENERATED CRC CODE TO CALCULATED CRC CODE
;          2507      end;
;
;                                    .SBTTL  ERR.CHK.CRC
;                          ERR.CHK.CRC:
;                                    JSR     R1,$SAVE3                 ;                                   2470
;                                    MOV     #-1,R1                    ; *,POS                             2493
;                                    MOV     #11,R2                    ; *,STK.PTR                         2495
;                          1$:       INC     R1                        ; POS                               2497
;                                    CLR     R3                        ; TEMP                              2498
```

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                                        ;ML4                                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                                       14-May-1981 13:05:08    PA:<
                                                BISB    STACK(R2),R3            ; *(STK.PTR),TEMP
                                                MOV     #P.GEN,-(SP)            ;                                                       2499
                                                MOV     R1,-(SP)                ; POS,*
                                                MOV     #1,-(SP)
                                                MOV     R3,-(SP)                ; TEMP,*
                                                BIC     #177776,(SP)
                                                JSR     PC,BL$PU2
                                                MOV     #A.GEN,(SP)             ;                                                       2500
                                                MOV     R1,-(SP)                ; POS,*
                                                MOV     #1,-(SP)
                                                CLR     -(SP)
                                                BIT     #2,R3                   ; *,TEMP
                                                BEQ     2$
                                                INC     (SP)
                                        2$:     COM     (SP)
                                                JSR     PC,BL$PU2
                                                MOV     #B.GEN,(SP)             ;                                                       2501
                                                MOV     R1,-(SP)                ; POS,*
                                                MOV     #1,-(SP)
                                                CLR     -(SP)
                                                BIT     #4,R3                   ; *,TEMP
                                                BEQ     3$
                                                INC     (SP)
                                        3$:     COM     (SP)
                                                JSR     PC,BL$PU2
                                                ADD     #24,SP                  ;                                                       2496
                                                ADD     #12,R2                  ; *,STK.PTR                                             2495
                                                CMP     R2,#73                  ; STK.PTR,*
                                                BLE     1$
                                                CMP     P.GEN,P.CAL             ;                                                       2504
                                                BNE     4$
                                                CMP     A.GEN,A.CAL
                                                BNE     4$
                                                CMP     B.GEN,B.CAL
                                                BEQ     5$
                                        4$:     MOV     #1,R1
                                                BR      6$
                                        5$:     CLR     R1
                                        6$:     MOV     R1,R0                   ;                                                       2471
                                                RTS     PC                      ;                                                       2470

                                        ; Routine Size:  71 words
                                        ; Maximum stack depth per invocation:  14 words
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (10)

```
;ML4
;
;                2508  routine FIND_COMP_BIT (BITS_XFERED) =
;                2509      begin
;                2510
;                2511  !++
;                2512  ! FUNCTIONAL DESCRIPTION:
;                2513  !       'FIND COMPLIMENT'  BIT IS CALLED BY THE
;                2514  !       SYNDROME DECODE TESTS AND INDEXES INTO
;                2515  !       THE IO_BUF LOOKING FOR COMPLIMENTED
;                2516  !       BITS.  A COMPLIMENTED BIT IS BY DEF A ONE
;                2517  !
;                2518  !       A ONE IS RETURNED IF THE INDEXED BIT IS
;                2519  !       NOT SET
;                2520  !
;                2521  ! FORMAL PARAMETERS:
;                2522  !       BITS_XFERED
;                2523  !       REPRESENTS THE BIT BEING TESTED
;                2524  !       IN THE DRIVE AND FROM THIS THE
;                2525  !       WORD AND BIT INDEX INTO THE
;                2526  !       IO_BUF CAN BE CALCULATED
;                2527  !
;                2528  ! IMPLICIT INPUTS:
;                2529  !--
;                2530
;                2531      local
;                2532          COMP_WRD,                       !WORD WHERE COMPLINEMT BIT IS LOCATED
;                2533          COMP_BIT,                       !BIT THAT IS COMPLINEMTED
;                2534          BUF_SAV : bitvector [16];       !STORES THE WORD IN WHICH THE BIT IS COMPLIMENTED
;                2535
;                2536      COMP_WRD = .BITS_XFERED/16;         !CALCULATE THE COMP WORD
;                2537      COMP_BIT = .BITS_XFERED mod 16;     !CALCULATE THE COMP BIT
;                2538      BUF_SAV = .IO_BUF [.COMP_WRD];      !LOAD THE COMP WORD INTO BUF_SAV
;                2539      IO_BUF [.COMP_WRD] = ZEROES;        !ZERO THE COMP WORD
;                2540
;                2541      if .BUF_SAV [.COMP_BIT] IS_NOT_SET then return ZERO else return ONE;
;                2542
;                2543                                          !FIND COMPLIMENTED BIT AND RETURN ERROR STATUS
;                2544      end;
;
                                        .SBTTL  FIND.COMP.BIT
015430                          FIND.COMP.BIT:
015430  004167  166410                JSR     R1,$SAVE2                       ;                               2508
015434  005746                        TST     -(SP)
015436  016646  000012                MOV     12(SP),-(SP)                    ; BITS.XFERED,*                 2536
015442  012746  000020                MOV     #20,-(SP)
015446  004767  166300                JSR     PC,BL$DIV
015452  010001                        MOV     R0,R1                           ; *,COMP.WRD
```

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                                                                                    14-May-1981 13:48:54    TOPS
                                                                                    14-May-1981 13:05:08    PA:<
3089                            ;ML4
3090                            ;
3091
3092 015454  016616  000016              MOV     16(SP),(SP)             ; BITS.XFERED,*                         2537
3093 015460  012746  000020              MOV     #20,-(SP)
3094 015464  004767  166274              JSR     PC,BL$MOD
3095 015470  010002                      MOV     R0,R2                   ; *,COMP.BIT
3096 015472  010100                      MOV     R1,R0                   ; COMP.WRD,*                            2538
3097 015474  006300                      ASL     R0
3098 015476  016066  011600  000006      MOV     IO.BUF(R0),6(SP)        ; *,BUF.SAV
3099 015504  005060  011600              CLR     IO.BUF(R0)              ;                                       2539
3100 015510  010200                      MOV     R2,R0                   ; COMP.BIT,*                            2541
3101 015512  006200                      ASR     R0
3102 015514  006200                      ASR     R0
3103 015516  006200                      ASR     R0
3104 015520  012701  000006              MOV     #6,R1
3105 015524  060601                      ADD     SP,R1                   ; BUF.SAV,*
3106 015526  060100                      ADD     R1,R0
3107 015530  010046                      MOV     R0,-(SP)
3108 015532  010246                      MOV     R2,-(SP)                ; COMP.BIT,*
3109 015534  042716  177770              BIC     #177770,(SP)
3110 015540  012746  000001              MOV     #1,-(SP)
3111 015544  005046                      CLR     -(SP)
3112 015546  004767  165366              JSR     PC,BL$GT2
3113 015552  062706  000010              ADD     #10,SP
3114 015556  005700                      TST     R0
3115 015560  001002                      BNE     1$
3116 015562  005001                      CLR     R1
3117 015564  000402                      BR      2$
3118 015566  012701  000001      1$:     MOV     #1,R1
3119 015572  010100              2$:     MOV     R1,R0                   ;                                       2509
3120 015574  062706  000010              ADD     #10,SP                  ;                                       2508
3121 015600  000207                      RTS     PC
3122
3123                            ; Routine Size:  53 words
3124                            ; Maximum stack depth per invocation:  11 words
3129
3130
```

```
                                                        14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                        14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (11)

;ML4
;
;          2545  routine FORCE_REM (PLOG, CHAN) : novalue =
;          2546      begin
;          2547
;          2548  !++
;          2549  ! FUNCTIONAL DESCRIPTION:
;          2550  !       VIA ECC_DM AND THE PRECALCULATED MODULO 2
;          2551  !       REMAINDERS STORED IN REM_TBL[], THE
;          2552  !       CRC_A,CRC_B AND PAR_CRC_WRD
;          2553  !       ARE FORCED WITH ERRONEOUS CRC DATA TO
;          2554  !       FORCE PERDICTABLE ECC ERRORS
;          2555  !
;          2556  ! FORMAL PARAMETERS:
;          2557  !       PLOG
;          2558  !       POINTS TO ONE OF THE SIX WORDS OF
;          2559  !       A CRC GROUP
;          2560  !
;          2561  !       CHAN
;          2562  !       POINTS TO ONE OF 36 CHANNELS IN
;          2563  !       A CRC GROUP
;          2564  !
;          2565  ! IMPLICIT INPUTS:
;          2566  !--
;          2567
;          2568      local
;          2569          ALOG,                                   !INDEX INTO REM_TBL
;          2570          BLOG;                                   !INDEX INTO REM_TBL
;          2571
;          2572      ALOG = .PLOG + .CHAN;                       !CALCULATE A_LOG
;          2573      BLOG = .PLOG + .CHAN*2;                     !CALCULATE B_LOG
;          2574
;          2575      while .ALOG geq 63 do                       !REDUCE A_LOG UNTIL < 64
;          2576          ALOG = .ALOG - 63;
;          2577
;          2578      while .BLOG geq 63 do                       !REDUCE B_LOG UNTIL < 64
;          2579          BLOG = .BLOG - 63;
;          2580
;          2581      ECC_DM = ONE;                               !SET ECC DIAG MODE
;          2582      PAR_CRC_WRD = .REM_TBL [.PLOG];             !LOAD PAR_CRC_WRD WITH REM_TBL
;          2583      CRC_A = .REM_TBL [.ALOG];                   !LOAD CRC_A WITH REM_TBL
;          2584      CRC_B = .REM_TBL [.BLOG];                   !LOAD CRC_B WITH REM_TBL
;          2585      end;
;
                                        .SBTTL  FORCE.REM
015602                          FORCE.REM:
015602  004167  166252                 JSR     R1,$SAVE3                       ;                       2545
015606  016600  000014                 MOV     14(SP),R0                       ; PLOG,*                2572
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                MOV     R0,R2                   ; *,ALOG
                                                ADD     12(SP),R2               ; CHAN,ALOG
                                                MOV     12(SP),R1               ; CHAN,*                                2573
                                                ASL     R1
                                                ADD     R0,R1
                                        1$:     CMP     R2,#77                  ; ALOG,*                                2575
                                                BLT     2$
                                                SUB     #77,R2                  ; *,ALOG                                2576
                                                BR      1$                      ;                                       2575
                                        2$:     CMP     R1,#77                  ; BLOG,*                                2578
                                                BLT     3$
                                                SUB     #77,R1                  ; *,BLOG                                2579
                                                BR      2$                      ;                                       2578
                                        3$:     BISB    #1,@ML.REG+120          ;                                       2581
                                                MOVB    REM.TBL(R0),R3          ;                                       2582
                                                SWAB    R3
                                                BIC     #140377,R3
                                                BIC     #37400,@ML.REG+150
                                                BIS     R3,@ML.REG+150
                                                MOVB    REM.TBL(R2),R3          ; *(ALOG),*                             2583
                                                BIC     #177700,R3
                                                BIC     #77,@ML.REG+150
                                                BIS     R3,@ML.REG+150
                                                MOVB    REM.TBL(R1),R3          ; *(BLOG),*                             2584
                                                BIC     #177700,R3
                                                BIC     #77,@ML.REG+160
                                                BIS     R3,@ML.REG+160
                                                RTS     PC                      ;                                       2545

                                ; Routine Size:  55 words
                                ; Maximum stack depth per invocation:  4 words
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (12)
;ML4
;
;          2586  routine FOR_ECC_ERR (SGL, UNC) : novalue =
;          2587      begin
;          2588
;          2589  !++
;          2590  ! FUNCTIONAL DESCRIPTION:
;          2591  !       'FORCE ECC ERROR' WHEN CALLED WILL FORCE
;          2592  !       VIA ECC DIAG MODE, SINGLE BIT ECC ERRORS
;          2593  !       OR UNCORRECTABLE ECC ERRORS INTO THE
;          2594  !       ECC DIAGNOSTIC REGISTERS
;          2595  !
;          2596  ! FORMAL PARAMETERS:
;          2597  !       SGL
;          2598  !       WHEN SET TO A ONE THIS
;          2599  !       ROUTINE WILL FORCE SINGLE BIT ERRORS
;          2600  !
;          2601  !       UNC
;          2602  !       WHEN SET TO A ONE THIS ROUTINE WILL
;          2603  !       FORCE UNCORRECTABLE ECC ERRORS
;          2604  !
;          2605  ! IMPLICIT INPUTS:
;          2606  !--
;          2607
;          2608      ECC_DM = ONE;                                 !SET ECC DIAG MODE
;          2609
;          2610      if .SGL                                       !IF SGL IS TRUE
;          2611      then
;          2612          begin                                     !THEN FORCE A SINGLE BIT ERROR
;          2613          PAR_CRC_WRD = %b'111111';
;          2614          CRC_A = %b'000000';
;          2615          CRC_B = %b'000000';
;          2616          end
;          2617      else
;          2618          begin                                     !ELSE FORCE A UNCORRECTABLE ERROR
;          2619          PAR_CRC_WRD = %b'111111';
;          2620          CRC_A = %b'111111';
;          2621          CRC_B = %b'000000';
;          2622          end;
;          2623
;          2624      end;
;3274
;3275                                        .SBTTL  FOR.ECC.ERR
3279 015760                          FOR.ECC.ERR:
3280 015760  152777  000001  175306          BISB    #1,@ML.REG+120          ;                       2608
3281 015766  032766  000001  000004          BIT     #1,4(SP)                ; *,SGL                 2610
3282 015774  001407                          BEQ     1$
3283 015776  052777  037400  175320          BIS     #37400,@ML.REG+150      ;                       2613
```

```
3285                                    ;ML4                                                    14-May-1981 13:48:54    TOPS
3286                                    ;                                                       14-May-1981 13:05:08    PA:<
3287
3288 016004  042777  000077  175312          BIC     #77,@ML.REG+150                 ;                               2614
3289 016012  000406                          BR      2$                              ;                               2615
3290 016014  052777  037400  175302  1$:     BIS     #37400,@ML.REG+150              ;                               2619
3291 016022  052777  000077  175274          BIS     #77,@ML.REG+150                 ;                               2620
3292 016030  042777  000077  175276  2$:     BIC     #77,@ML.REG+160                 ;                               2621
3293 016036  000207                          RTS     PC                              ;                               2586
3294
3295                                    ; Routine Size:  24 words
3296                                    ; Maximum stack depth per invocation:  0 words
3301
3302
```

```
:ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
:                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (13)

:          2625  routine FIRST_BLK_XFER : novalue =
:          2626
:          2627  !++
:          2628  ! FUNCTIONAL DESCRIPTION:
:          2629  !       A REPEATEDLY CALLED SEQUENCE OF
:          2630  !       ASSIGNMENT EXPRESSION TO LOAD
:          2631  !       THE DSA, BUS ADRS AND WORD COUNT
:          2632  !       REGISTERS WITH APPROPRIATE INFORMATION
:          2633  !       BEFORE MASS BUS TRANSFERS CAN
:          2634  !       COMMENCE.
:          2635  !
:          2636  !       LOADS A MASS_BUS BLOCK XFERR AT
:          2637  !       BLOCK ZERO.
:          2638  !
:          2639  !--
:          2640
:          2641      begin
:          2642      ECC_DIS = ONE;                            !DISABLE ECC CORRECTION
:          2643      MLDA = ZEROES;                            !LOAD THE DSA REG WITH SECTOR ZERO
:          2644      MLBA = IO_BUF;                            !LOAD THE BUS ADDRESS REG WITH IO_BUF ADRS
:          2645      MLWC = not 255;                           !LOAD WORD COUNT REG WITH COMPLIMENT 256
:          2646      end;
3332
3333                                        .SBTTL  FIRST.BLK.XFER
3337 016040                           FIRST.BLK.XFER:
3338 016040  152777  000002  175226          BISB    #2,@ML.REG+120          ;                       2642
3339 016046  005077  175132                  CLR     @ML.REG+30              ;                       2643
3340 016052  012777  011600  175114          MOV     #IO.BUF,@ML.REG+20      ;                       2644
3341 016060  012777  177400  175076          MOV     #-400,@ML.REG+10        ;                       2645
3342 016066  000207                          RTS     PC                      ;                       2625
3343
3344                                ; Routine Size:  12 words
3345                                ; Maximum stack depth per invocation:  0 words
3350
3351
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (14)

;ML4
;
;                2647  routine GD_BLK_XFER : novalue =
;                2648
;                2649  !++
;                2650  ! FUNCTIONAL DESCRIPTION:
;                2651  !       A REPEATEDLY CALLED SEQUENCE OF
;                2652  !       ASSIGNMENT EXPRESSIONS TO LOAD
;                2653  !       THE DSA, BUS ADRS AND WORD
;                2654  !       COUNT REGISTERS WITH APPROPRIATE
;                2655  !       INFORMATION BEFORE A MASS BUS
;                2656  !       TRANSFERS CAN COMMENCE
;                2657  !
;                2658  !       LOADS A MASS BUS BLOCK XFERR
;                2659  !       AT THE GOOD BLOCK ADRS FOUND
;                2660  !       BY THE READ WRITE ARRAYS WITH
;                2661  !       PROM DATA TEST
;                2662  !
;                2663  !--
;                2664
;                2665      begin
;                2666      ECC_DIS = ONE;                    !DISABLE ERROR CORRECTION
;                2667      MLDA = .GOOD_BLK;                 !LOAD DSA REG WITH THE GOOD BLOCK ADRS
;                2668      MLBA = IO_BUF;                    !LOAD BUS ADRS REG WITH IO_BUF ADRS
;                2669      MLWC = not 255;                   !LOAD WORD COUNT REG WITH COMPLIMENT 256
;                2670      end;
;
;                                        .SBTTL  GD.BLK.XFER
;
016070                              GD.BLK.XFER:
016070  152777  000002  175176              BISB    #2,@ML.REG+120          ;                       2666
016076  016777  173462  175100              MOV     GOOD.BLK,@ML.REG+30     ;                       2667
016104  012777  011600  175062              MOV     #IO.BUF,@ML.REG+20      ;                       2668
016112  012777  177400  175044              MOV     #-400,@ML.REG+10        ;                       2669
016120  000207                              RTS     PC                      ;                       2647
;
;                                ; Routine Size:  13 words
;                                ; Maximum stack depth per invocation:  0 words
;
;
;
```

```
3404 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
3405 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (15)
3406
3407 ;          2671  routine LAST_BLK_XFER : novalue =
3408 ;          2672
3409 ;          2673  !++
3410 ;          2674  ! FUNCTIONAL DESCRIPTION:
3411 ;          2675  !       A REPEATEDLY CALLED SEQUENCE OF
3412 ;          2676  !       ASSIGNMENT EXPRESSIONS TO LOAD
3413 ;          2677  !       THE DSA, BUS ADRS AND WORD
3414 ;          2678  !       COUNT REGISTERS WITH APPROPRIATE
3415 ;          2679  !       INFORMATION BEFORE A MBUS
3416 ;          2680  !       TRANSFER CAN COMMENCE
3417 ;          2681  !
3418 ;          2682  !       LOADS A MASS BUS BLOCK
3419 ;          2683  !       TRANSFER AT THE LAST BLOCK
3420 ;          2684  !       ADDRESS
3421 ;          2685  !
3422 ;          2686  !--
3423 ;          2687
3424 ;          2688      begin
3425 ;          2689      ECC_DIS = ONE;                    !DISABLE ERROR CORRECTION
3426 ;          2690      MLDA = .LST_BLK;                  !LOAD DSA REG WITH THE LAST BLOCK ADRS
3427 ;          2691      MLBA = IO_BUF;                    !LOAD BUS ADRS REG WITH THE IO_BUF ADRS
3428 ;          2692      MLWC = not 255;                   !LOAD WORD COUNT REG WITH COMPLIMENT 256
3429 ;          2693      end;
3433
3434                                        .SBTTL  LAST.BLK.XFER
3438 016122                          LAST.BLK.XFER:
3439 016122  152777  000002  175144          BISB    #2,@ML.REG+120          ;                2689
3440 016130  016777  173436  175046          MOV     LST.BLK,@ML.REG+30      ;                2690
3441 016136  012777  011600  175030          MOV     #IO.BUF,@ML.REG+20      ;                2691
3442 016144  012777  177400  175012          MOV     #-400,@ML.REG+10        ;                2692
3443 016152  000207                          RTS     PC                      ;                2671
3444
3445                                ; Routine Size:  13 words
3446                                ; Maximum stack depth per invocation:  0 words
3451
3452
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (16)

```
3454 ;ML4
3455 ;
3456
3457 ;          2694  routine TST_LNG_WRD (NIB_NUM, NIB_PAT, ERR_FLG) : novalue =
3458 ;          2695      begin
3459 ;          2696
3460 ;          2697  !++
3461 ;          2698  ! FUNCTIONAL DESCRIPTION:
3462 ;          2699  !       COMPARES THE CURRENT NIBBLE
3463 ;          2700  !       POSITION IN 'NIB_SAVE' WITH THE
3464 ;          2701  !       CURRENT TEST PATTERN.  IF THE
3465 ;          2702  !       TWO VALUES ARE NOT EQUAL AN
3466 ;          2703  !       ERROR FLG IS SET WHICH THE
3467 ;          2704  !       CALLER CAN INTERIGATE
3468 ;          2705  !
3469 ;          2706  ! FORMAL PARAMETERS:
3470 ;          2707  !       NIB_NUM
3471 ;          2708  !       CASE SELECT EXPRESSION TO SELECT THE
3472 ;          2709  !       CURRENT NIBBLE TO BE EXAMINED
3473 ;          2710  !
3474 ;          2711  !       NIB_PAT
3475 ;          2712  !       CURRENT NIBBLE PATTERN TO BE
3476 ;          2713  !       COMPARED
3477 ;          2714  !
3478 ;          2715  !       ERR_FLG
3479 ;          2716  !       CONTAINS THE ADDRESS (PASSED BY REF)
3480 ;          2717  !       OF THE CALLERS ERROR FLG
3481 ;          2718  !       TO ENABLE THE CALLER TO EXAMINE
3482 ;          2719  !       THE ERROR STATUS OF THE ROUTINE CALL
3483 ;          2720  !
3484 ;          2721  ! IMPLICIT INPUTS:
3485 ;          2722  !       NIB_SAVE
3486 ;          2723  !       BLOCK OF 3 WORDS TO STORE
3487 ;          2724  !       THE DATA FOUND IN MLD1, MLD2
3488 ;          2725  !       AND MLE2 AFTER A DIAGNOSTIC MODE
3489 ;          2726  !       READ
3490 ;          2727  !
3491 ;          2728  ! IMPLICIT OUTPUTS:     NONE
3492 ;          2729  !--
3493 ;          2730
3494 ;          2731      .ERR_FLG = ZERO;                        !CLEAR THE ERROR FLAG BACK IN THE CALLING ROUTINE
3495 ;          2732
3496 ;          2733      case .(NIB_NUM) from 0 to 9 of          !SELECT THE NIBBLE TO BE TESTED
3497 ;          2734          set
3498 ;          2735
3499 ;          2736          [0] :
3500 ;          2737
3501 ;          2738              if .NIB_SAVE [NIB_0] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
3502 ;          2739
3503 ;          2740                                              !TEST NIBBLE 0 AND SET ERR FLG IF NEQ
3504 ;          2741
3505 ;          2742          [1] :
3506 ;          2743
3507 ;          2744              if .NIB_SAVE [NIB_1] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
3508 ;          2745
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (16)

;          2746                                         !TEST NIBBLE 1 AND SET ERR FLG IF NEQ
;          2747
;          2748          [2] :
;          2749
;          2750              if .NIB_SAVE [NIB_2] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2751
;          2752                                         !TEST NIBBLE 2 AND SET ERR FLG IF NEQ
;          2753
;          2754          [3] :
;          2755
;          2756              if .NIB_SAVE [NIB_3] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2757
;          2758                                         !TEST NIBBLE 3 AND SET ERR FLG IF NEQ
;          2759
;          2760          [4] .
;          2761
;          2762              if .NIB_SAVE [NIB_4] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2763
;          2764                                         !TEST NIBBLE 4 AND SET ERR FLG IF NEQ
;          2765
;          2766          [5] :
;          2767
;          2768              if .NIB_SAVE [NIB_5] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2769
;          2770                                         !TEST NIBBLE 5 AND SET ERR FLG IF NEQ
;          2771
;          2772          [6] :
;          2773
;          2774              if .NIB_SAVE [NIB_6] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2775
;          2776                                         !TEST NIBBLE 6 AND SET ERR FLG IF NEQ
;          2777
;          2778          [7] :
;          2779
;          2780              if .NIB_SAVE [NIB_7] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2781
;          2782                                         !TEST NIBBLE 7 AND SET ERR FLG IF NEQ
;          2783
;          2784          [8] :
;          2785
;          2786              if .NIB_SAVE [NIB_8] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2787
;          2788                                         !TEST NIBBLE 8 AND SET ERR FLG IF NEQ
;          2789
;          2790          [9] :
;          2791
;          2792              if .NIB_SAVE [NIB_9] neq .(NIB_PAT)<0, 3>
;          2793              then
;          2794                  .ERR_FLG = ONE           !TEST NIBBLE 9 AND SET ERR FLG IF NEQ
;          2795          tes;
;          2796
;          2797      end;
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (16)

```
3566 ;ML4
3567 ;
3568
3572
3573                                    .SBTTL  TST.LNG.WRD
3577 016154                     TST.LNG.WRD:
3578 016154  004167  165664              JSR     R1,$SAVE2                       ;                                       2694
3579 016160  016600  000010              MOV     10(SP),R0                       ; ERR.FLG,*                             2731
3580 016164  005010                      CLR     (R0)
3581 016166  016601  000014              MOV     14(SP),R1                       ; NIB.NUM,*                             2733
3582 016172  006301                      ASL     R1
3583 016174  066107  016200              ADD     1$(R1),PC
3584 016200  000024                 1$:  .WORD   2$-1$
3585 016202  000052                      .WORD   3$-1$
3586 016204  000110                      .WORD   4$-1$
3587 016206  000140                      .WORD   5$-1$
3588 016210  000200                      .WORD   6$-1$
3589 016212  000226                      .WORD   7$-1$
3590 016214  000264                      .WORD   8$-1$
3591 016216  000314                      .WORD   9$-1$
3592 016220  000354                      .WORD   10$-1$
3593 016222  000404                      .WORD   11$-1$
3594 016224  016602  000012         2$:  MOV     12(SP),R2                       ; NIB.PAT,*                             2738
3595 016230  042702  177760              BIC     #177760,R2
3596 016234  016701  172712              MOV     NIB.SAVE,R1
3597 016240  042701  177760              BIC     #177760,R1
3598 016244  020102                      CMP     R1,R2
3599 016246  001577                      BEQ     13$
3600 016250  000574                      BR      12$
3601 016252  016601  000012         3$:  MOV     12(SP),R1                       ; NIB.PAT,*                             2744
3602 016256  042701  177760              BIC     #177760,R1
3603 016262  016702  172664              MOV     NIB.SAVE,R2
3604 016266  006202                      ASR     R2
3605 016270  006202                      ASR     R2
3606 016272  006202                      ASR     R2
3607 016274  006202                      ASR     R2
3608 016276  042702  177760              BIC     #177760,R2
3609 016302  020201                      CMP     R2,R1
3610 016304  001560                      BEQ     13$
3611 016306  000555                      BR      12$
3612 016310  016601  000012         4$:  MOV     12(SP),R1                       ; NIB.PAT,*                             2750
3613 016314  042701  177760              BIC     #177760,R1
3614 016320  016702  172626              MOV     NIB.SAVE,R2
3615 016324  000302                      SWAB    R2
3616 016326  042702  177760              BIC     #177760,R2
3617 016332  020201                      CMP     R2,R1
3618 016334  001544                      BEQ     13$
3619 016336  000541                      BR      12$
3620 016340  016601  000012         5$:  MOV     12(SP),R1                       ; NIB.PAT,*                             2756
```

```
3622                                    ;ML4
3623                                    ;
3624
3625 016344  042701  177760                    BIC     #177760,R1
3626 016350  016702  172576                    MOV     NIB.SAVE,R2
3627 016354  006202                            ASR     R2
3628 016356  006202                            ASR     R2
3629 016360  006202                            ASR     R2
3630 016362  006202                            ASR     R2
3631 016364  000302                            SWAB    R2
3632 016366  042702  177760                    BIC     #177760,R2
3633 016372  020201                            CMP     R2,R1
3634 016374  001524                            BEQ     13$
3635 016376  000521                            BR      12$
3636 016400  016601  000012            6$:     MOV     12(SP),R1       ; NIB.PAT,*                 2762
3637 016404  042701  177760                    BIC     #177760,R1
3638 016410  016702  172540                    MOV     NIB.SAVE+2,R2
3639 016414  042702  177760                    BIC     #177760,R2
3640 016420  020201                            CMP     R2,R1
3641 016422  001511                            BEQ     13$
3642 016424  000506                            BR      12$
3643 016426  016601  000012            7$:     MOV     12(SP),R1       ; NIB.PAT,*                 2768
3644 016432  042701  177760                    BIC     #177760,R1
3645 016436  016702  172512                    MOV     NIB.SAVE+2,R2
3646 016442  006202                            ASR     R2
3647 016444  006202                            ASR     R2
3648 016446  006202                            ASR     R2
3649 016450  006202                            ASR     R2
3650 016452  042702  177760                    BIC     #177760,R2
3651 016456  020201                            CMP     R2,R1
3652 016460  001472                            BEQ     13$
3653 016462  000467                            BR      12$
3654 016464  016601  000012            8$:     MOV     12(SP),R1       ; NIB.PAT,*                 2774
3655 016470  042701  177760                    BIC     #177760,R1
3656 016474  016702  172454                    MOV     NIB.SAVE+2,R2
3657 016500  000302                            SWAB    R2
3658 016502  042702  177760                    BIC     #177760,R2
3659 016506  020201                            CMP     R2,R1
3660 016510  001456                            BEQ     13$
3661 016512  000453                            BR      12$
3662 016514  016601  000012            9$:     MOV     12(SP),R1       ; NIB.PAT,*                 2780
3663 016520  042701  177760                    BIC     #177760,R1
3664 016524  016702  172424                    MOV     NIB.SAVE+2,R2
3665 016530  006202                            ASR     R2
3666 016532  006202                            ASR     R2
3667 016534  006202                            ASR     R2
3668 016536  006202                            ASR     R2
3669 016540  000302                            SWAB    R2
3670 016542  042702  177760                    BIC     #177760,R2
3671 016546  020201                            CMP     R2,R1
3672 016550  001436                            BEQ     13$
3673 016552  000433                            BR      12$
3674 016554  016601  000012            10$:    MOV     12(SP),R1       ; NIB.PAT,*                 2786
3675 016560  042701  177760                    BIC     #177760,R1
3676 016564  016702  172366                    MOV     NIB.SAVE+4,R2
```

```
3678                            ;ML4                                                    14-May-1981 13:48:54    TOPS
3679                            ;                                                       14-May-1981 13:05:08    PA:<
3680
3681  016570  000302                        SWAB    R2
3682  016572  042702  177760                BIC     #177760,R2
3683  016576  020201                        CMP     R2,R1
3684  016600  001422                        BEQ     13$
3685  016602  000417                        BR      12$
3686  016604  016601  000012    11$:        MOV     12(SP),R1               ; NIB.PAT,*                     2792
3687  016610  042701  177770                BIC     #177770,R1
3688  016614  016702  172336                MOV     NIB.SAVE+4,R2
3689  016620  006202                        ASR     R2
3690  016622  006202                        ASR     R2
3691  016624  006202                        ASR     R2
3692  016626  006202                        ASR     R2
3693  016630  000302                        SWAB    R2
3694  016632  042702  177770                BIC     #177770,R2
3695  016636  020201                        CMP     R2,R1
3696  016640  001402                        BEQ     13$
3697  016642  012710  000001    12$:        MOV     #1,(R0)                 ;                               2794
3698  016646  000207            13$:        RTS     PC                      ;                               2694
3699
3700                            ; Routine Size:  158 words
3701                            ; Maximum stack depth per invocation:  3 words
3706
3707
```

```
3709 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
3710 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (17)
3711
3712 ;          2798  routine XCR_LNG_WRD (NIB_NUM, NIB_PAT, RESULT) : novalue =
3713 ;          2799      begin
3714 ;          2800
3715 ;          2801  !++
3716 ;          2802  ! FUNCTIONAL DESCRIPTION:
3717 ;          2803  !       EXCLUSIVE ORS THE CURRENT
3718 ;          2804  !       NIBBLE POSITION IN 'NIB_SAVE'
3719 ;          2805  !       WITH THE CURRENT TEST PATTERN
3720 ;          2806  !       AND ASSIGNS THE RESULTS TO THE
3721 ;          2807  !       FORMAL PARAMETER 'RESULT'.
3722 ;          2808  !
3723 ;          2809  ! FORMAL PARAMETERS:
3724 ;          2810  !       NIB_NUM
3725 ;          2811  !       CASE SELECT EXPRESSION TO
3726 ;          2812  !       SELECT THE CURRENT NIBBLE TO BE
3727 ;          2813  !        EXAMINED
3728 ;          2814  !
3729 ;          2815  !       NIB_PAT
3730 ;          2816  !       CURRENT NIBBLE PATTERN TO BE
3731 ;          2817  !       XOR'ED
3732 ;          2818  !
3733 ;          2819  !       RESULT
3734 ;          2820  !       CONTAINS THE ADDRESS (PASSED BY REF)
3735 ;          2821  !       OF AN OWN STORAGE LOCATION TO
3736 ;          2822  !       ENABLE THE CALLER TO EXAMINE THE XOR RESULTS.
3737 ;          2823  !
3738 ;          2824  ! IMPLICIT INPUTS:
3739 ;          2825  !       NIB_SAVE
3740 ;          2826  !       BLOCK OF 3 WORDS TO STORE
3741 ;          2827  !       THE DATA FOUND IN MLD1
3742 ;          2828  !       MLD2 AND MLE2 AFTER A
3743 ;          2829  !       DIAGNOSTIC MODE READ.
3744 ;          2830  !
3745 ;          2831  ! IMPLICIT OUTPUTS:    NONE
3746 ;          2832  !--
3747 ;          2833
3748 ;          2834      case .(NIB_NUM) from 0 to 9 of              !SELECT THE NIBBLE TO BE XOR'ED
3749 ;          2835          set
3750 ;          2836
3751 ;          2837          [0] :
3752 ;          2838              .RESULT = .NIB_SAVE [NIB_0] xor .NIB_PAT;
3753 ;          2839                                          !XOR NIBBLE 0 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
3754 ;          2840
3755 ;          2841          [1] :
3756 ;          2842              .RESULT = .NIB_SAVE [NIB_1] xor .NIB_PAT;
3757 ;          2843                                          !XOR NIBBLE 1 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
3758 ;          2844
3759 ;          2845          [2] :
3760 ;          2846              .RESULT = .NIB_SAVE [NIB_2] xor .NIB_PAT;
3761 ;          2847                                          !XOR NIBBLE 2 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
3762 ;          2848
3763 ;          2849          [3] :
```

```
                                                        14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                        14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (17)

3765 ;ML4
3766 ;
3767
3768 ;          2850              .RESULT = .NIB_SAVE [NIB_3] xor .NIB_PAT;
3769 ;          2851                                        !XOR NIBBLE 3 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
3770 ;          2852
3771 ;          2853          [4] :
3772 ;          2854              .RESULT = .NIB_SAVE [NIB_4] xor .NIB_PAT;
3773 ;          2855                                        !XOR NIBBLE 4 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
3774 ;          2856
3775 ;          2857          [5] :
3776 ;          2858              .RESULT = .NIB_SAVE [NIB_5] xor .NIB_PAT;
3777 ;          2859                                        !XOR NIBBLE 5 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
3778 ;          2860
3779 ;          2861          [6] :
3780 ;          2862              .RESULT = .NIB_SAVE [NIB_6] xor .NIB_PAT;
3781 ;          2863                                        !XOR NIBBLE 6 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
3782 ;          2864
3783 ;          2865          [7] :
3784 ;          2866              .RESULT = .NIB_SAVE [NIB_7] xor .NIB_PAT;
3785 ;          2867                                        !XOR NIBBLE 7 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
3786 ;          2868
3787 ;          2869          [8] :
3788 ;          2870              .RESULT = .NIB_SAVE [NIB_8] xor .NIB_PAT;
3789 ;          2871                                        !XOR NIBBLE 8 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
3790 ;          2872
3791 ;          2873          [9] :
3792 ;          2874              .RESULT = .NIB_SAVE [NIB_9] xor .NIB_PAT
3793 ;          2875                                        !XOR NIBBLE 9 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
3794 ;          2876          tes;
3795 ;          2877
3796 ;          2878      end;
3800
3801                                  .SBTTL  XOR.LNG.WRD
3805 016650                      XOR.LNG.WRD:
3806 016650  004167  165222              JSR     R1,$SAVE4               ;                                       2798
3807 016654  016601  000016              MOV     16(SP),R1               ; NIB.PAT,*                             2838
3808 016660  016602  000014              MOV     14(SP),R2               ; RESULT,*
3809 016664  016600  000020              MOV     20(SP),R0               ; NIB.NUM,*                             2834
3810 016670  006300                      ASL     R0
3811 016672  066007  016676              ADD     1$(R0),PC
3812 016676  000024              1$:     .WORD   2$-1$
3813 016700  000036                      .WORD   3$-1$
3814 016702  000062                      .WORD   4$-1$
3815 016704  000070                      .WORD   5$-1$
3816 016706  000076                      .WORD   6$-1$
3817 016710  000120                      .WORD   8$-1$
3818 016712  000136                      .WORD   9$-1$
3819 016714  000144                      .WORD   10$-1$
```

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                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                        .WORD   12$-1$
                                        .WORD   15$-1$
016722  016712  172224        2$:     MOV     NIB.SAVE,(R2)                   ;                               2838
016726  042712  177760                BIC     #177760,(R2)
016732  000472                        BR      17$
016734  016703  172212        3$:     MOV     NIB.SAVE,R3                     ;                               2842
016740  006203                        ASR     R3
016742  006203                        ASR     R3
016744  006203                        ASR     R3
016746  006203                        ASR     R3
016750  042703  177760                BIC     #177760,R3
016754  010312                        MOV     R3,(R2)
016756  000412                        BR      7$
016760  016704  172166        4$:     MOV     NIB.SAVE,R4                     ;                               2846
016764  000437                        BR      13$
016766  016704  172160        5$:     MOV     NIB.SAVE,R4                     ;                               2850
016772  000425                        BR      11$
016774  016712  172154        6$:     MOV     NIB.SAVE+2,(R2)                 ;                               2854
017000  042712  177760                BIC     #177760,(R2)
017004  010104                7$:     MOV     R1,R4
017006  041204                        BIC     (R2),R4
017010  040112                        BIC     R1,(R2)
017012  050412                        BIS     R4,(R2)
017014  000207                        RTS     PC                              ;                               2834
017016  016704  172132        8$:     MOV     NIB.SAVE+2,R4                   ;                               2858
017022  006204                        ASR     R4
017024  006204                        ASR     R4
017026  006204                        ASR     R4
017030  006204                        ASR     R4
017032  000415                        BR      14$
017034  016704  172114        9$:     MOV     NIB.SAVE+2,R4                   ;                               2862
017040  000411                        BR      13$
017042  016704  172106        10$:    MOV     NIB.SAVE+2,R4                   ;                               2866
017046  006204                11$:    ASR     R4
017050  006204                        ASR     R4
017052  006204                        ASR     R4
017054  006204                        ASR     R4
017056  000402                        BR      13$
017060  016704  172072        12$:    MOV     NIB.SAVE+4,R4                   ;                               2870
017064  000304                13$:    SWAB    R4
017066  042704  177760        14$:    BIC     #177760,R4
017072  000411                        BR      16$
017074  016704  172056        15$:    MOV     NIB.SAVE+4,R4                   ;                               2874
017100  006204                        ASR     R4
017102  006204                        ASR     R4
017104  006204                        ASR     R4
017106  006204                        ASR     R4
017110  000304                        SWAB    R4
017112  042704  177770                BIC     #177770,R4
017116  010412                16$:    MOV     R4,(R2)
017120  010103                17$:    MOV     R1,R3
017122  041203                        BIC     (R2),R3
```

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                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                
017124  040112                          BIC     R1,(R2)
017126  050312                          BIS     R3,(R2)
017130  000207                          RTS     PC                              ;                               2798
                                
                                ; Routine Size:  89 words
                                ; Maximum stack depth per invocation:  5 words
```

```
3893 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
3894 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (18)
3895 ;
3896 ;          2879  routine LD_LNG_WRD (NIB_NUM, NIB_PAT) : novalue =
3897 ;          2880      begin
3898 ;          2881
3899 ;          2882  !++
3900 ;          2883  ! FUNCTIONAL DESCRIPTION:
3901 ;          2884  !       LOADS 'NIB_SAVE' WITH UNIQUE
3902 ;          2885  !       NIBBLE PATTERNS PRIOR TO WRITING
3903 ;          2886  !       TO MLD1, MLD2 AND MLE2
3904 ;          2887  !       DATA DIAGNOSTIC REGISTERS.
3905 ;          2888  !
3906 ;          2889  ! FORMAL PARAMETERS:
3907 ;          2890  !       NIB_NUM
3908 ;          2891  !       CASE SELECT EXPRESSION TO SELECT
3909 ;          2892  !       THE CURRENT NIBBLE TO BE LOADED
3910 ;          2893  !
3911 ;          2894  !       NIB_PAT
3912 ;          2895  !       CURRENT NIBBLE PATTERN TO BE
3913 ;          2896  !       LOADED
3914 ;          2897  !
3915 ;          2898  ! IMPLICIT INPUTS:
3916 ;          2899  !       NIB_SAVE
3917 ;          2900  !       BLOCK OF 3 WORDS TO STORE
3918 ;          2901  !       THE DATA TO BE WRITTEN
3919 ;          2902  !       INTO MLD1 MLD2 MLE2
3920 ;          2903  !
3921 ;          2904  ! IMPLICIT OUTPUTS:
3922 ;          2905  !       NIB_SAVE IS LOADED WIH
3923 ;          2906  !       THE CURRENT NIBBLE PATTERN
3924 ;          2907  !--
3925 ;          2908
3926 ;          2909      case .(NIB_NUM) from 0 to 9 of          !SELECT THE NIBBLE LOCATION IN NIB_SAVE TO BE LOADED
3927 ;          2910          set
3928 ;          2911
3929 ;          2912          [0] :
3930 ;          2913              NIB_SAVE [NIB_0] = .NIB_PAT;    !LOAD NIBBLE 0 WITH NIB_PAT
3931 ;          2914
3932 ;          2915          [1] :
3933 ;          2916              NIB_SAVE [NIB_1] = .NIB_PAT;    !LOAD NIBBLE 1 WITH NIB_PAT
3934 ;          2917
3935 ;          2918          [2] :
3936 ;          2919              NIB_SAVE [NIB_2] = .NIB_PAT;    !LOAD NIBBLE 2 WITH NIB_PAT
3937 ;          2920
3938 ;          2921          [3] :
3939 ;          2922              NIB_SAVE [NIB_3] = .NIB_PAT;    !LOAD NIBBLE 3 WITH NIB_PAT
3940 ;          2923
3941 ;          2924          [4] :
3942 ;          2925              NIB_SAVE [NIB_4] = .NIB_PAT;    !LOAD NIBBLE 4 WITH NIB_PAT
3943 ;          2926
3944 ;          2927          [5] :
3945 ;          2928              NIB_SAVE [NIB_5] = .NIB_PAT;    !LOAD NIBBLE 5 WITH NIB_PAT
3946 ;          2929
3947 ;          2930          [6] :
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (18)

3949 ;ML4
3950 :
3951
3952 :          2931                NIB_SAVE [NIB_6] = .NIB_PAT;        !LOAD NIBBLE 6 WITH NIB_PAT
3953 :          2932
3954 :          2933            [7] :
3955 :          2934                NIB_SAVE [NIB_7] = .NIB_PAT;        !LOAD NIBBLE 7 WITH NIB_PAT
3956 :          2935
3957 :          2936            [8] :
3958 :          2937                NIB_SAVE [NIB_8] = .NIB_PAT;        !LOAD NIBBLE 8 WITH NIB_PAT
3959 :          2938
3960 :          2939            [9] :
3961 :          2940                NIB_SAVE [NIB_9] = .NIB_PAT         !LOAD NIBBLE 9 WITH NIB_PAT
3962 :          2941            tes;
3963 :          2942
3964 :          2943        end;
3968
3969                                        .SBTTL  LD.LNG.WRD
3973 017132                            LD.LNG.WRD:
3974 017132  010146                            MOV     R1,-(SP)                    ;                                   2879
3975 017134  016600  000004                    MOV     4(SP),R0                    ; NIB.PAT,*                         2913
3976 017140  016601  000006                    MOV     6(SP),R1                    ; NIB.NUM,*                         2909
3977 017144  006301                            ASL     R1
3978 017146  066107  017152                    ADD     1$(R1),PC
3979 017152  000024                    1$:     .WORD   2$-1$
3980 017154  000040                            .WORD   3$-1$
3981 017156  000064                            .WORD   4$-1$
3982 017160  000102                            .WORD   5$-1$
3983 017162  000134                            .WORD   7$-1$
3984 017164  000150                            .WORD   8$-1$
3985 017166  000174                            .WORD   9$-1$
3986 017170  000212                            .WORD   10$-1$
3987 017172  000244                            .WORD   12$-1$
3988 017174  000262                            .WORD   13$-1$
3989 017176  042700  177760           2$:     BIC     #177760,R0                  ;                                   2913
3990 017202  142767  000017  171742            BICB    #17,NIB.SAVE
3991 017210  000433                            BR      6$
3992 017212  006300                    3$:     ASL     R0                          ;                                   2916
3993 017214  006300                            ASL     R0
3994 017216  006300                            ASL     R0
3995 017220  006300                            ASL     R0
3996 017222  042700  177417                    BIC     #177417,R0
3997 017226  142767  000360  171716            BICB    #360,NIB.SAVE
3998 017234  000421                            BR      6$
3999 017236  000300                    4$:     SWAB    R0                          ;                                   2919
4000 017240  042700  170377                    BIC     #170377,R0
4001 017244  042767  007400  171700            BIC     #7400,NIB.SAVE
4002 017252  000412                            BR      6$
4003 017254  000300                    5$:     SWAB    R0                          ;                                   2922
```

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                                                                                14-May-1981 13:48:54    TOPS
                                                                                14-May-1981 13:05:08    PA:<
4005                            ;ML4
4006                            ;
4007
4008 017256  006300                    ASL     R0
4009 017260  006300                    ASL     R0
4010 017262  006300                    ASL     R0
4011 017264  006300                    ASL     R0
4012 017266  042700  007777            BIC     #7777,R0
4013 017272  042767  170000  171652    BIC     #170000,NIB.SAVE
4014 017300  050067  171646    6$:     BIS     R0,NIB.SAVE
4015 017304  000467                    BR      15$                             ;                       2909
4016 017306  042700  177760    7$:     BIC     #177760,R0                      ;                       2925
4017 017312  142767  000017  171634    BICB    #17,NIB.SAVE+2
4018 017320  000433                    BR      11$
4019 017322  006300                    ASL     R0                              ;                       2928
4020 017324  006300                    ASL     R0
4021 017326  006300                    ASL     R0
4022 017330  006300                    ASL     R0
4023 017332  042700  177417            BIC     #177417,R0
4024 017336  142767  000360  171610    BICB    #360,NIB.SAVE+2
4025 017344  000421                    BR      11$
4026 017346  000300            9$:     SWAB    R0                              ;                       2931
4027 017350  042700  170377            BIC     #170377,R0
4028 017354  042767  007400  171572    BIC     #7400,NIB.SAVE+2
4029 017362  000412                    BR      11$
4030 017364  000300           10$:     SWAB    R0                              ;                       2934
4031 017366  006300                    ASL     R0
4032 017370  006300                    ASL     R0
4033 017372  006300                    ASL     R0
4034 017374  006300                    ASL     R0
4035 017376  042700  007777            BIC     #7777,R0
4036 017402  042767  170000  171544    BIC     #170000,NIB.SAVE+2
4037 017410  050067  171540   11$:     BIS     R0,NIB.SAVE+2
4038 017414  000423                    BR      15$                             ;                       2909
4039 017416  000300           12$:     SWAB    R0                              ;                       2937
4040 017420  042700  170377            BIC     #170377,R0
4041 017424  042767  007400  171524    BIC     #7400,NIB.SAVE+4
4042 017432  000412                    BR      14$
4043 017434  000300           13$:     SWAB    R0                              ;                       2940
4044 017436  006300                    ASL     R0
4045 017440  006300                    ASL     R0
4046 017442  006300                    ASL     R0
4047 017444  006300                    ASL     R0
4048 017446  042700  107777            BIC     #107777,R0
4049 017452  042767  070000  171476    BIC     #70000,NIB.SAVE+4
4050 017460  050067  171472   14$:     BIS     R0,NIB.SAVE+4
4051 017464  012601           15$:     MOV     (SP)+,R1                        ;                       2879
4052 017466  000207                    RTS     PC
4053
4054                            ; Routine Size:  111 words
4055                            ; Maximum stack depth per invocation:  2 words
```

```
 4061 ;ML4                                                          14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 4062 ;                                                             14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (19)
 4063
 4064 ;          2944  routine WRT_CS1 (TST_PAT, index) : novalue =
 4065 ;          2945      begin
 4066 ;          2946
 4067 ;          2947  !++
 4068 ;          2948  ! FUNCTIONAL DESCRIPTION:
 4069 ;          2949  !
 4070 ;          2950  !       LOADS THE CONTROL & STATUS REGISTER 1 WITH A DATA PATTERN
 4071 ;          2951  !       GENERATED BY THE MACRO WRT_MASK.
 4072 ;          2952  !
 4073 ;          2953  ! FORMAL PARAMETERS:
 4074 ;          2954  !       TST_PAT
 4075 ;          2955  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
 4076 ;          2956  !
 4077 ;          2957  !       INDEX
 4078 ;          2958  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
 4079 ;          2959  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
 4080 ;          2960  !
 4081 ;          2961  !--
 4082 ;          2962
 4083 ;          2963      MLCS1 = WRT_MASK;                          !LOAD GENERATED WRT_MASK PATTERN INTO MLCS1
 4084 ;          2964      end;
 4088
 4089                                    .SBTTL  WRT.CS1
 4093 017470  004167  164350      WRT.CS1:JSR     R1,$SAVE2                       ;                              2944
 4094 017474  016600  000010              MOV     10(SP),R0                       ; INDEX,*                      2963
 4095 017500  006300                      ASL     R0
 4096 017502  006300                      ASL     R0
 4097 017504  006300                      ASL     R0
 4098 017506  010001                      MOV     R0,R1
 4099 017510  016100  013156              MOV     ML.REG+2(R1),R0
 4100 017514  056600  000012              BIS     12(SP),R0                       ; TST.PAT,*
 4101 017520  046100  013160              BIC     ML.REG+4(R1),R0
 4102 017524  016102  013162              MOV     ML.REG+6(R1),R2
 4103 017530  050002                      BIS     R0,R2
 4104 017532  010277  173416              MOV     R2,@ML.REG
 4105 017536  000207                      RTS     PC                              ;                              2944
 4106
 4107                                ; Routine Size:  20 words
 4108                                ; Maximum stack depth per invocation:  3 words
 4113
 4114
```

```
:ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
:                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (20)

;          2965  routine RD_CS1 (TST_PAT, index, ERR_FLG) : novalue =
;          2966      begin
;          2967
;          2968  !++
;          2969  ! FUNCTIONAL DESCRIPTION:
;          2970  !
;          2971  !       COMPARES THE CONTENTS OF THE
;          2972  !       CONTROL & STATUS REGISTER 1
;          2973  !       WITH THE MASKED DATA PATTERN
;          2974  !       GENERATED BY THE MACRO 'WRT_MASK'
;          2975  !
;          2976  !       IF THE COMPARE IS NOT EQUAL THEN
;          2977  !       THE FORMAL PARAMETER 'ERR_FLG' IS
;          2978  !       ASSIGNED A ONE TO INDICATE THE
;          2979  !       ERROR.
;          2980  !
;          2981  ! FORMAL PARAMETERS:
;          2982  !
;          2983  !       TST_PAT
;          2984  !       DATA PATTERN TO BE MASKED AND
;          2985  !       COMPARED AGAINST THE CONTENTS
;          2986  !       OF THE REGISTER UNDER TEST.
;          2987  !
;          2988  !       INDEX
;          2989  !        USED BY THE MACRO WRT_MASK TO
;          2990  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          2991  !       FORCED HI, FORCED LO AND DON'T CARE
;          2992  !       MASK INFORMATION.
;          2993  !
;          2994  !       ERR_FLG
;          2995  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          2996  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          2997  !       CALLER TO EXAMINE THE ERROR STATUS
;          2998  !       OF THE ROUTINE CALL.
;          2999  !
;          3000  ! IMPLICIT INPUTS:
;          3001  !       WT_DATA
;          3002  !         GETS LOADED WITH THE GENERATED
;          3003  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          3004  !         CALLER TO PRINT FAILING GOOD DATA.
;          3005  !
;          3006  !       RD_DATA
;          3007  !         GETS LOADED WITH DATA READ FROM THE
;          3008  !         REGISTER THUS ALLOWING CALLER
;          3009  !         TO PRINT FAILING BAD DATA.
;          3010  !
;          3011  ! IMPLICIT OUTPUTS:
;          3012  !       GLOBAL LOCATION WR_DATA
;          3013  !       AND RD_DATA LOADED WITH GOOD
;          3014  !       AND BAD REGISTER DATA
;          3015  !--
;          3016
```

```
 4172 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 v2(212)
 4173 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (20)
 4174
 4175 ;          3017      .ERR_FLG = ZERO;                   !CLEAR ERROR FLAG
 4176 ;          3018      WT_DATA = WRT_MASK;                !SAVE THE DATA WRITTEN TO THE REGISTER
 4177 ;          3019      RD_DATA = .ML.CS1 or .IGNORE;      !READ AND SAVE THE REGISTER
 4178 ;          3020
 4179 ;          3021      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
 4180 ;          3022
 4181 ;          3023                                         !SET ERROR FLAG IF NEQ
 4182 ;          3024      end;
 4186
 4187                                        .SBTTL  RD.CS1
 4191 017540  004167  164300          RD.CS1: JSR     R1,$SAVE2                   ;                          2965
 4192 017544  005076  000010                  CLR     @10(SP)                     ; ERR.FLG                  3017
 4193 017550  016600  000012                  MOV     12(SP),R0                   ; INDEX,*                  3018
 4194 017554  006300                          ASL     R0
 4195 017556  006300                          ASL     R0
 4196 017560  006300                          ASL     R0
 4197 017562  010001                          MOV     R0,R1
 4198 017564  016100  013156                  MOV     ML.REG+2(R1),R0
 4199 017570  056600  000014                  BIS     14(SP),R0                   ; TST.PAT,*
 4200 017574  046100  013160                  BIC     ML.REG+4(R1),R0
 4201 017600  016102  013162                  MOV     ML.REG+6(R1),R2
 4202 017604  050002                          BIS     R0,R2
 4203 017606  010267  173314                  MOV     R2,WT.DATA
 4204 017612  017702  173336                  MOV     @ML.REG,R2                  ;                          3019
 4205 017616  056102  013162                  BIS     ML.REG+6(R1),R2
 4206 017622  010267  173302                  MOV     R2,RD.DATA
 4207 017626  026767  173274  173274        CMP     WT.DATA,RD.DATA             ;                          3021
 4208 017634  001403                          BEQ     1$
 4209 017636  012776  000001  000010        MOV     #1,@10(SP)                  ; *,ERR.FLG
 4210 017644  000207                  1$:     RTS     PC                          ;                          2965
 4211
 4212                                        ; Routine Size:  35 words
 4213                                        ; Maximum stack depth per invocation:  3 words
 4218
 4219
```

```
 4221 :ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 4222 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (21)
 4223
 4224 :          3025  routine WRT_ER (TST_PAT, index) : novalue =
 4225 :          3026      begin
 4226 :          3027
 4227 :          3028  !++
 4228 :          3029  ! FUNCTIONAL DESCRIPTION:
 4229 :          3030  !
 4230 :          3031  !       LOADS THE ERROR REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
 4231 :          3032  !
 4232 :          3033  ! FORMAL PARAMETERS:
 4233 :          3034  !
 4234 :          3035  !       TST_PAT
 4235 :          3036  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
 4236 :          3037  !
 4237 :          3038  !       INDEX
 4238 :          3039  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
 4239 :          3040  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
 4240 :          3041  !--
 4241 :          3042
 4242 :          3043      MLER = WRT_MASK;                          !LOAD GENERATE WRT_MASK PATTERN INTO MLER
 4243 :          3044      end;
 4247
 4248                                          .SBTTL  WRT.ER
 4252 017646  004167  164172          WRT.ER: JSR     R1,$SAVE2                       ;                       3025
 4253 017652  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3043
 4254 017656  006300                          ASL     R0
 4255 017660  006300                          ASL     R0
 4256 017662  006300                          ASL     R0
 4257 017664  010001                          MOV     R0,R1
 4258 017666  016100  013156                  MOV     ML.REG+2(R1),R0
 4259 017672  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
 4260 017676  046100  013160                  BIC     ML.REG+4(R1),R0
 4261 017702  016102  013162                  MOV     ML.REG+6(R1),R2
 4262 017706  050002                          BIS     R0,R2
 4263 017710  010277  173320                  MOV     R2,@ML.REG+60
 4264 017714  000207                          RTS     PC                              ;                       3025
 4265
 4266                                  ; Routine Size:  20 words
 4267                                  ; Maximum stack depth per invocation:  3 words
 4272
 4273
```

```
4275 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
4276 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (22)
4277
4278 ;          3045  routine RD_ER (TST_PAT, index, ERR_FLG) : novalue =
4279 ;          3046      begin
4280 ;          3047
4281 ;          3048  !++
4282 ;          3049  ! FUNCTIONAL DESCRIPTION:
4283 ;          3050  !
4284 ;          3051  !       COMPARES THE CONTENTS OF THE
4285 ;          3052  !       ERROR REGISTER WITH
4286 ;          3053  !       THE MASKED DATA PATTERN
4287 ;          3054  !       GENERATED BY THE MACRO 'WRT_MASK'.
4288 ;          3055  !
4289 ;          3056  !       IF THE COMPARE IS NOT EQUAL THEN
4290 ;          3057  !       THE FORMAL PARAMETER 'ERR_FLG' IS
4291 ;          3058  !       ASSIGNED A ONE TO INDICATE THE
4292 ;          3059  !       ERROR.
4293 ;          3060  !
4294 ;          3061  ! FORMAL PARAMETERS:
4295 ;          3062  !
4296 ;          3063  !       TST_PAT
4297 ;          3064  !       DATA PATTERN TO BE MASKED AND
4298 ;          3065  !       COMPARED AGAINST THE CONTENTS
4299 ;          3066  !       OF THE REGISTER UNDER TEST.
4300 ;          3067  !
4301 ;          3068  !       INDEX
4302 ;          3069  !       USED BY THE MACRO WRT_MASK TO
4303 ;          3070  !       SELECT THE CURRENT REGISTERS ADDRESS,
4304 ;          3071  !       FORCED HI, FORCED LO AND DON'T CARE
4305 ;          3072  !       MASK INFORMATION.
4306 ;          3073  !
4307 ;          3074  !       ERR_FLG
4308 ;          3075  !       CONTAINS THE ADDRESS (PASSED BY REF)
4309 ;          3076  !       OF THE CALLERS ERROR FLG TO ENABLE THE
4310 ;          3077  !       CALLER TO EXAMINE THE ERROR STATUS
4311 ;          3078  !       OF THE ROUTINE CALL.
4312 ;          3079  !
4313 ;          3080  ! IMPLICIT INPUTS:
4314 ;          3081  !       WT_DATA
4315 ;          3082  !         GETS LOADED WITH THE GENERATED
4316 ;          3083  !         WRT_MASK DATA PATTERN THUS ALLOWING
4317 ;          3084  !         CALLER TO PRINT FAILING GOOD DATA.
4318 ;          3085  !
4319 ;          3086  !       RD_DATA
4320 ;          3087  !         GETS LOADED WITH DATA READ FROM THE
4321 ;          3088  !         REGISTER THUS ALLOWING CALLER
4322 ;          3089  !         TO PRINT FAILING BAD DATA.
4323 ;          3090  !
4324 ;          3091  ! IMPLICIT OUTPUTS:
4325 ;          3092  !       GLOBAL LOCATION WR_DATA
4326 ;          3093  !       AND RD_DATA LOADED WITH GOOD
4327 ;          3094  !       AND BAD REGISTER DATA
4328 ;          3095  !
4329 ;          3096  !--
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (22)

;          3097
;          3098       .ERR_FLG = ZERO;                          !CLEAR THE ERROR FLAG
;          3099       WT_DATA = WRT_MASK;                       !SAVE THE DATA WRITTEN TO THE REGISTER
;          3100       RD_DATA = .MLER or .IGNORE;               !READ AND SAVE THE REGISTER
;          3101
;          3102       if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3103
;          3104                                                 !SET ERROR FLAG IF NEQ
;          3105       end;

                                    .SBTTL  RD.ER
017716  004167  164122        RD.ER:  JSR     R1,$SAVE2                   ;                       3045
017722  005076  000010                CLR     @10(SP)                     ; ERR.FLG               3098
017726  016600  000012                MOV     12(SP),R0                   ; INDEX,*               3099
017732  006300                        ASL     R0
017734  006300                        ASL     R0
017736  006300                        ASL     R0
017740  010001                        MOV     R0,R1
017742  016100  013156                MOV     ML.REG+2(R1),R0
017746  056600  000014                BIS     14(SP),R0                   ; TST.PAT,*
017752  046100  013160                BIC     ML.REG+4(R1),R0
017756  016102  013162                MOV     ML.REG+6(R1),R2
017762  050002                        BIS     R0,R2
017764  010267  173136                MOV     R2,WT.DATA
017770  017702  173240                MOV     @ML.REG+60,R2               ;                       3100
017774  056102  013162                BIS     ML.REG+6(R1),R2
020000  010267  173124                MOV     R2,RD.DATA
020004  026767  173116  173116        CMP     WT.DATA,RD.DATA             ;                       3102
020012  001403                        BEQ     1$
020014  012776  000001  000010        MOV     #1,@10(SP)                  ; *,ERR.FLG
020022  000207              1$:       RTS     PC                          ;                       3045

                        ; Routine Size:  35 words
                        ; Maximum stack depth per invocation:  3 words
```

```
:ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
:                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (23)

;          3106  routine WRT_DA (TST_PAT, index) : novalue =
;          3107      begin
;          3108
;          3109  !++
;          3110  ! FUNCTIONAL DESCRIPTION:
;          3111  !
;          3112  !       LOADS THE DESIRED SECTOR WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;          3113  !
;          3114  ! FORMAL PARAMETERS:
;          3115  !
;          3116  !       TST_PAT
;          3117  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3118  !
;          3119  !       INDEX
;          3120  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3121  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3122  !--
;          3123
;          3124      MLDA = WRT_MASK;                          !LOAD MLDA WITH GENERATED WRT_MASK PATTERN
;          3125      end;

                                    .SBTTL  WRT.DA
020024  004167  164014        WRT.DA: JSR     R1,$SAVE2                       ;                       3106
020030  016600  000010                MOV     10(SP),R0                       ; INDEX,*               3124
020034  006300                        ASL     R0
020036  006300                        ASL     R0
020040  006300                        ASL     R0
020042  010001                        MOV     R0,R1
020044  016100  013156                MOV     ML.REG+2(R1),R0
020050  056600  000012                BIS     12(SP),R0                       ; TST.PAT,*
020054  046100  013160                BIC     ML.REG+4(R1),R0
020060  016102  013162                MOV     ML.REG+6(R1),R2
020064  050002                        BIS     R0,R2
020066  010277  173112                MOV     R2,@ML.REG+30
020072  000207                        RTS     PC                              ;                       3106

                                ; Routine Size:  20 words
                                ; Maximum stack depth per invocation:  3 words
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (24)

```
4435 ;ML4
4436 :
4437
4438 ;          3126  routine RD_DA (TST_PAT, index, ERR_FLG) : novalue =
4439 ;          3127      begin
4440 ;          3128
4441 ;          3129  !++
4442 ;          3130  ! FUNCTIONAL DESCRIPTION:
4443 ;          3131  !
4444 ;          3132  !       COMPARES THE CONTENTS OF THE
4445 ;          3133  !       DESIRED SECTOR ADDRESS REGISTER
4446 ;          3134  !       WITH THE MASKED DATA PATTERN
4447 ;          3135  !       GENERATED BY THE MACRO 'WRT_MASK'
4448 ;          3136  !
4449 ;          3137  !       IF THE COMPARE IS NOT EQUAL THEN
4450 ;          3138  !       THE FORMAL PARAMETER 'ERR_FLG' IS
4451 ;          3139  !       ASSIGNED A ONE TO INDICATE THE
4452 ;          3140  !       ERROR
4453 ;          3141  !
4454 ;          3142  ! FORMAL PARAMETERS:
4455 ;          3143  !
4456 ;          3144  !       TST_PAT
4457 ;          3145  !       DATA PATTERN TO BE MASKED AND
4458 ;          3146  !       COMPARED AGAINST THE CONTENTS
4459 ;          3147  !       OF THE REGISTER UNDER TEST
4460 ;          3148  !
4461 ;          3149  !       INDEX
4462 ;          3150  !       USED BY THE MACRO WRT_MASK TO
4463 ;          3151  !       SELECT THE CURRENT REGISTERS ADDRESS,
4464 ;          3152  !       FORCED HI, FORCED LO AND DON'T CARE
4465 ;          3153  !       MASK INFORMATION
4466 ;          3154  !
4467 ;          3155  !       ERR_FLG
4468 ;          3156  !       CONTAINS THE ADDRESS (PASSED BY REF)
4469 ;          3157  !       OF THE CALLERS ERROR FLG TO ENABLE THE
4470 ;          3158  !       CALLER TO EXAMINE THE ERROR STATUS
4471 ;          3159  !       OF THE ROUTINE CALL.
4472 ;          3160  ! IMPLICIT INPUTS:
4473 ;          3161  !       WT_DATA
4474 ;          3162  !         GETS LOADED WITH THE GENERATED
4475 ;          3163  !         WRT_MASK DATA PATTERN THUS ALLOWING
4476 ;          3164  !         CALLER TO PRINT FAILING GOOD DATA.
4477 ;          3165  !
4478 ;          3166  !       RD_DATA
4479 ;          3167  !         GETS LOADED WITH DATA READ FROM THE
4480 ;          3168  !         REGISTER THUS ALLOWING CALLER
4481 ;          3169  !         TO PRINT FAILING BAD DATA.
4482 ;          3170  !
4483 ;          3171  ! IMPLICIT OUTPUTS:
4484 ;          3172  !       GLOBAL LOCATION WR_DATA
4485 ;          3173  !       AND RD_DATA LOADED WITH GOOD
4486 ;          3174  !       AND BAD REGISTER DATA
4487 ;          3175  !
4488 ;          3176  !--
4489 ;          3177
```

```
                                                
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (25)

;          3186  routine WRT_MR (TST_PAT, index) : novalue =
;          3187      begin
;          3188
;          3189  !++
;          3190  ! FUNCTIONAL DESCRIPTION:
;          3191  !
;          3192  !       LOADS THE MAINTENANCE REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;          3193  !
;          3194  ! FORMAL PARAMETERS:
;          3195  !
;          3196  !       TST_PAT
;          3197  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3198  !
;          3199  !       INDEX
;          3200  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3201  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3202  !--
;          3203
;          3204      MLMR = WRT_MASK;                          !LOAD MLMR WITH GENERATED WRT_MASK PATTERN
;          3205      end;

                                    .SBTTL  WRT.MR
020202  004167  163636        WRT.MR: JSR     R1,$SAVE2                       ;                       3186
020206  016600  000010                MOV     10(SP),R0                       ; INDEX,*               3204
020212  006300                        ASL     R0
020214  006300                        ASL     R0
020216  006300                        ASL     R0
020220  010001                        MOV     R0,R1
020222  016100  013156                MOV     ML.REG+2(R1),R0
020226  056600  000012                BIS     12(SP),R0                       ; TST.PAT,*
020232  046100  013160                BIC     ML.REG+4(R1),R0
020236  016102  013162                MOV     ML.REG+6(R1),R2
020242  050002                        BIS     R0,R2
020244  010277  173024                MOV     R2,@ML.REG+120
020250  000207                        RTS     PC                              ;               3186

                                ; Routine Size:  20 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (26)

;          3206  routine RD_MR (TST_PAT, index, ERR_FLG) : novalue =
;          3207      begin
;          3208
;          3209  !++
;          3210  ! FUNCTIONAL DESCRIPTION:
;          3211  !
;          3212  !       COMPARES THE CONTENTS OF THE
;          3213  !       MAINTENANCE REGISTER WITH THE
;          3214  !       MASKED DATA PATTERN
;          3215  !       GENERATED BY THE MACRO 'WRT_MASK'.
;          3216  !
;          3217  !       IF THE COMPARE IS NOT EQUAL THEN
;          3218  !       THE FORMAL PARAMETER 'ERR_FLG' IS
;          3219  !       ASSIGNED A ONE TO INDICATE THE
;          3220  !       ERROR.
;          3221  !
;          3222  ! FORMAL PARAMETERS:
;          3223  !
;          3224  !       TST_PAT
;          3225  !       DATA PATTERN TO BE MASKED AND
;          3226  !       COMPARED AGAINST THE CONTENTS
;          3227  !       OF THE REGISTER UNDER TEST.
;          3228  !
;          3229  !       INDEX
;          3230  !       USED BY THE MACRO WRT_MASK TO
;          3231  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3232  !       FORCED HI, FORCED LO AND DON'T CARE
;          3233  !       MASK INFORMATION.
;          3234  !
;          3235  !       ERR_FLG
;          3236  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          3237  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          3238  !       CALLER TO EXAMINE THE ERROR STATUS
;          3239  !       OF THE ROUTINE CALL.
;          3240  !
;          3241  ! IMPLICIT INPUTS:
;          3242  !       WT_DATA
;          3243  !         GETS LOADED WITH THE GENERATED
;          3244  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          3245  !         CALLER TO PRINT FAILING GOOD DATA.
;          3246  !
;          3247  !       RD_DATA
;          3248  !         GETS LOADED WITH DATA READ FROM THE
;          3249  !         REGISTER THUS ALLOWING CALLER
;          3250  !         TO PRINT FAILING BAD DATA.
;          3251  !
;          3252  ! IMPLICIT OUTPUTS:
;          3253  !       GLOBAL LOCATION WR_DATA
;          3254  !       AND RD_DATA LOADED WITH GOOD
;          3255  !       AND BAD REGISTER DATA
;          3256  !
;          3257  !--
```

```
                                                                14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (26)
;ML4
;
;          3258
;          3259       .ERR_FLG = ZERO;                         !CLEAR THE ERROR FLAG
;          3260       WT_DATA = WRT_MASK;                      !SAVE THE DATA WRITTEN TO THE REGISTER
;          3261       RD_DATA = .ML@MR or .IGNORE;             !READ AND SAVE THE REGISTER
;          3262
;          3263       if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3264
;          3265                                                !SET ERROR FLAG IF NEQ
;          3266       end;

                                .SBTTL  RD.MR
020252 004167 163566      RD.MR: JSR     R1,$SAVE2                ;                                    3206
020256 005076 000010             CLR     @10(SP)                  ; ERR.FLG                            3259
020262 016600 000012             MOV     12(SP),R0                ; INDEX,*                            3260
020266 006300                    ASL     R0
020270 006300                    ASL     R0
020272 006300                    ASL     R0
020274 010001                    MOV     R0,R1
020276 016100 013156             MOV     ML.REG+2(R1),R0
020302 056600 000014             BIS     14(SP),R0                ; 1ST.PAT,*
020306 046100 013160             BIC     ML.REG+4(R1),R0
020312 016102 013162             MOV     ML.REG+6(R1),R2
020316 050002                    BIS     R0,R2
020320 010267 172602             MOV     R2,WT.DATA
020324 017702 172744             MOV     @ML.REG+120,R2           ;                                    3261
020330 056102 013162             BIS     ML.REG+6(R1),R2
020334 010267 172570             MOV     R2,RD.DATA
020340 026767 172562 172562      CMP     WT.DATA,RD.DATA          ;                                    3263
020346 001403                    BEQ     1$
020350 012776 000001 000010      MOV     #1,@10(SP)               ; *,ERR.FLG
020356 000207             1$:    RTS     PC                       ;                                    3206

                          ; Routine Size:  35 words
                          ; Maximum stack depth per invocation:  3 words
```

```
 4700 :ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 4701 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (27)
 4702
 4703 ;          3267  routine WRT_PA (TST_PAT, index) : novalue =
 4704 ;          3268      begin
 4705 ;          3269
 4706 ;          3270  !++
 4707 ;          3271  ! FUNCTIONAL DESCRIPTION:
 4708 ;          3272  !       LOADS THE PROM ADDRESS REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
 4709 ;          3273  ! FORMAL PARAMETERS:
 4710 ;          3274  !       TST_PAT
 4711 ;          3275  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
 4712 ;          3276  !       INDEX
 4713 ;          3277  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
 4714 ;          3278  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
 4715 ;          3279  !--
 4716 ;          3280
 4717 ;          3281      PROM_DIS = ONE;                          !SET PROM DISABLE BIT
 4718 ;          3282      MLPA = WRT_MASK;                         !LOAD MLPA WITH GENERATED WRT_MASK PATTERN
 4719 ;          3283      PROM_DIS = ZERO;                         !CLEAR PROM DISABLE BIT
 4720 ;          3284      end;
 4724
 4725                                        .SBTTL  WRT.PA
 4729 020360  004167  163460          WRT.PA: JSR     R1,$SAVE2                ;                          3267
 4730 020364  152777  000040  172702         BISB    #40,@ML.REG+120          ;                          3281
 4731 020372  016600  000010                 MOV     10(SP),R0                ; INDEX,*                  3282
 4732 020376  006300                         ASL     R0
 4733 020400  006300                         ASL     R0
 4734 020402  006300                         ASL     R0
 4735 020404  010001                         MOV     R0,R1
 4736 020406  016100  013156                 MOV     ML.REG+2(R1),R0
 4737 020412  056600  000012                 BIS     12(SP),R0                ; TST.PAT,*
 4738 020416  046100  013160                 BIC     ML.REG+4(R1),R0
 4739 020422  016102  013162                 MOV     ML.REG+6(R1),R2
 4740 020426  050002                         BIS     R0,R2
 4741 020430  010277  172620                 MOV     R2,@ML.REG+100
 4742 020434  142777  000040  172632         BICB    #40,@ML.REG+120          ;                          3283
 4743 020442  000207                         RTS     PC                       ;                          3267
 4744
 4745                                ; Routine Size:  26 words
 4746                                ; Maximum stack depth per invocation:  3 words
 4751
 4752
```

```
4754 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
4755 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (28)
4756
4757 ;          3285  routine RD_PA (TST_PAT, index, ERR_FLG) : novalue =
4758 ;          3286      begin
4759 ;          3287
4760 ;          3288  !++
4761 ;          3289  ! FUNCTIONAL DESCRIPTION:
4762 ;          3290  !
4763 ;          3291  !       COMPARES THE CONTENTS OF THE
4764 ;          3292  !       PROM ADDRESS REGISTER
4765 ;          3293  !       WITH THE MASKED DATA PATTERN
4766 ;          3294  !       GENERATED BY THE MACRO 'WRT_MASK'.
4767 ;          3295  !
4768 ;          3296  !       IF THE COMPARE IS NOT EQUAL THEN
4769 ;          3297  !       THE FORMAL PARAMETER 'ERR_FLG' IS
4770 ;          3298  !       ASSIGNED A ONE TO INDICATE THE
4771 ;          3299  !       ERROR.
4772 ;          3300  !
4773 ;          3301  ! FORMAL PARAMETERS:
4774 ;          3302  !       TST_PAT
4775 ;          3303  !       DATA PATTERN TO BE MASKED AND
4776 ;          3304  !       COMPARED AGAINST THE CONTENTS
4777 ;          3305  !       OF THE REGISTER UNDER TEST.
4778 ;          3306  !
4779 ;          3307  !       INDEX
4780 ;          3308  !       USED BY THE MACRO WRT_MASK TO
4781 ;          3309  !       SELECT THE CURRENT REGISTERS ADDRESS,
4782 ;          3310  !       FORCED HI, FORCED LO AND DON'T CARE
4783 ;          3311  !       MASK INFORMATION.
4784 ;          3312  !
4785 ;          3313  !       ERR_FLG
4786 ;          3314  !       CONTAINS THE ADDRESS (PASSED BY REF)
4787 ;          3315  !       OF THE CALLERS ERROR FLG TO ENABLE THE
4788 ;          3316  !       CALLER TO EXAMINE THE ERROR STATUS
4789 ;          3317  !       OF THE ROUTINE CALL.
4790 ;          3318  !
4791 ;          3319  ! IMPLICIT INPUTS:
4792 ;          3320  !       WT_DATA
4793 ;          3321  !         GETS LOADED WITH THE GENERATED
4794 ;          3322  !         WRT_MASK DATA PATTERN THUS ALLOWING
4795 ;          3323  !         CALLER TO PRINT FAILING GOOD DATA.
4796 ;          3324  !
4797 ;          3325  !       RD_DATA
4798 ;          3326  !         GETS LOADED WITH DATA READ FROM THE
4799 ;          3327  !         REGISTER THUS ALLOWING CALLER
4800 ;          3328  !         TO PRINT FAILING BAD DATA.
4801 ;          3329  !
4802 ;          3330  ! IMPLICIT OUTPUTS:
4803 ;          3331  !       GLOBAL LOCATION WR_DATA
4804 ;          3332  !       AND RD_DATA LOADED WITH GOOD
4805 ;          3333  !       AND BAD REGISTER DATA
4806 ;          3334  !
4807 ;          3335  !--
4808 ;          3336
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (28)

;ML4
;
;          3337      .ERR_FLG = ZERO;                              !CLEAR THE ERROR FLAG
;          3338      PROM_DIS = ONE;                               !SET THE PROM DISABLE BIT
;          3339      WT_DATA = WRT_MASK;                           !SAVE THE DATA WRITTEN TO THE REGISTER
;          3340      RD_DATA = .MLPA or .IGNORE;                   !READ AND SAVE THE REGISTER
;          3341
;          3342      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3343
;          3344      PROM_DIS = ZERO;                              !SET ERROR IF NEQ
;          3345      end;                                          !CLEAR THE PROM DISABLE BIT

                                    .SBTTL  RD.PA
020444  004167  163374         RD.PA: JSR     R1,$SAVE2                       ;                                   3285
020450  005076  000010                CLR     @10(SP)                         ; ERR.FLG                           3337
020454  152777  000040  172612        BISB    #40,@ML.REG+120                 ;                                   3338
020462  016600  000012                MOV     12(SP),R0                       ; INDEX,*                           3339
020466  006300                        ASL     R0
020470  006300                        ASL     R0
020472  006300                        ASL     R0
020474  010001                        MOV     R0,R1
020476  016100  013156                MOV     ML.REG+2(R1),R0
020502  056600  000014                BIS     14(SP),R0                       ; TST.PAT,*
020506  046100  013160                BIC     ML.REG+4(R1),R0
020512  016102  013162                MOV     ML.REG+6(R1),R2
020516  050002                        BIS     R0,R2
020520  010267  172402                MOV     R2,WT.DATA
020524  017702  172524                MOV     @ML.REG+100,R2                  ;                                   3340
020530  056102  013162                BIS     ML.REG+6(R1),R2
020534  010267  172370                MOV     R2,RD.DATA
020540  026767  172362  172362        CMP     WT.DATA,RD.DATA                 ;                                   3342
020546  001403                        BEQ     1$
020550  012776  000001  000010        MOV     #1,@10(SP)                      ; *,ERR.FLG
020556  142777  000040  172510  1$:   BICB    #40,@ML.REG+120                 ;                                   3344
020564  000207                        RTS     PC                              ;                                   3285

                                ; Routine Size:  41 words
                                ; Maximum stack depth per invocation:  3 words
```

```
4862 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
4863 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (29)
4864
4865 ;          3346  routine WRT_E1 (TST_PAT, index) : novalue =
4866 ;          3347      begin
4867 ;          3348
4868 ;          3349  !++
4869 ;          3350  ! FUNCTIONAL DESCRIPTION:
4870 ;          3351  !       LOADS THE ECC CRC WORD REG 1 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
4871 ;          3352  ! FORMAL PARAMETERS:
4872 ;          3353  !       TST_PAT
4873 ;          3354  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
4874 ;          3355  !       INDEX
4875 ;          3356  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
4876 ;          3357  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
4877 ;          3358  !--
4878 ;          3359
4879 ;          3360      ECC_DM = ONE;                          !SET ECC DIAG MODE
4880 ;          3361      MLE1 = WRT_MASK;                       !LOAD MLE1 WITH GENERATED WRT_MASK PATTERN
4881 ;          3362      ECC_DM = ZERO;                         !CLEAR ECC DIAG MODE
4882 ;          3363      end;
4886
4887                                        .SBTTL  WRT.E1
4891 020566  004167  163252          WRT.E1: JSR     R1,$SAVE2                       ;                       3346
4892 020572  152777  000001  172474          BISB    #1,@ML.REG+120                  ;                       3360
4893 020600  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3361
4894 020604  006300                          ASL     R0
4895 020606  006300                          ASL     R0
4896 020610  006300                          ASL     R0
4897 020612  010001                          MOV     R0,R1
4898 020614  016100  013156                  MOV     ML.REG+2(R1),R0
4899 020620  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
4900 020624  046100  013160                  BIC     ML.REG+4(R1),R0
4901 020630  016102  013162                  MOV     ML.REG+6(R1),R2
4902 020634  050002                          BIS     R0,R2
4903 020636  010277  172462                  MOV     R2,@ML.REG+150
4904 020642  142777  000001  172424          BICB    #1,@ML.REG+120                  ;                       3362
4905 020650  000207                          RTS     PC                              ;                       3346
4906
4907                                ; Routine Size:  26 words
4908                                ; Maximum stack depth per invocation:  3 words
4913
4914
```

```
4916 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
4917 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (30)
4918
4919 ;          3364  routine RD_E1 (TST_PAT, index, ERR_FLG) : novalue =
4920 ;          3365      begin
4921 ;          3366
4922 ;          3367  !++
4923 ;          3368  ! FUNCTIONAL DESCRIPTION:
4924 ;          3369  !
4925 ;          3370  !       COMPARES THE CONTENTS OF THE
4926 ;          3371  !       ECC CRC WORD REGISTER 1
4927 ;          3372  !       WITH THE MASKED DATA PATTERN
4928 ;          3373  !       GENERATED BY THE MACRO 'WRT_MASK'
4929 ;          3374  !
4930 ;          3375  !       IF THE COMPARE IS NOT EQUAL THEN
4931 ;          3376  !        THE FORMAL PARAMETER 'ERR_FLG' IS
4932 ;          3377  !       ASSIGNED A ONE TO INDICATE THE ERROR.
4933 ;          3378  !
4934 ;          3379  ! FORMAL PARAMETERS:
4935 ;          3380  !       TST_PAT
4936 ;          3381  !       DATA PATTERN TO BE MASKED AND
4937 ;          3382  !       COMPARED AGAINST THE CONTENTS
4938 ;          3383  !       OF THE REGISTER UNDER TEST.
4939 ;          3384  !
4940 ;          3385  !       INDEX
4941 ;          3386  !       USED BY THE MACRO WRT_MASK TO
4942 ;          3387  !       SELECT THE CURRENT REGISTERS ADDRESS,
4943 ;          3388  !       FORCED HI, FORCED LO AND DON'T CARE
4944 ;          3389  !       MASK INFORMATION.
4945 ;          3390  !
4946 ;          3391  !       ERR_FLG
4947 ;          3392  !       CONTAINS THE ADDRESS (PASSED BY REF)
4948 ;          3393  !       OF THE CALLERS ERROR FLG TO ENABLE THE
4949 ;          3394  !       CALLER TO EXAMINE THE ERROR STATUS
4950 ;          3395  !       OF THE ROUTINE CALL.
4951 ;          3396  !
4952 ;          3397  ! IMPLICIT INPUTS:
4953 ;          3398  !       WT_DATA
4954 ;          3399  !         GETS LOADED WITH THE GENERATED
4955 ;          3400  !         WRT_MASK DATA PATTERN THUS ALLOWING
4956 ;          3401  !         CALLER TO PRINT FAILING GOOD DATA.
4957 ;          3402  !
4958 ;          3403  !       RD_DATA
4959 ;          3404  !         GETS LOADED WITH DATA READ FROM THE
4960 ;          3405  !         REGISTER THUS ALLOWING CALLER
4961 ;          3406  !         TO PRINT FAILING BAD DATA.
4962 ;          3407  !
4963 ;          3408  ! IMPLICIT OUTPUTS:
4964 ;          3409  !       GLOBAL LOCATION WR_DATA
4965 ;          3410  !       AND RD_DATA LOADED WITH GOOD
4966 ;          3411  !       AND BAD REGISTER DATA
4967 ;          3412  !
4968 ;          3413  !--
4969 ;          3414
4970 ;          3415      .ERR_FLG = ZERO;                          !CLEAR THE ERROR FLAG
```

```
 4972 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 4973 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (30)
 4974
 4975 ;          3416      ECC_DM = ONE;                      !SET ECC DIAG MODE
 4976 ;          3417      WT_DATA = WRT_MASK;                !SAVE THE DATA WRITTEN TO THE REGISTER
 4977 ;          3418      RD_DATA = .MLE1 or .IGNORE;        !READ AND SAVE THE REGISTER
 4978 ;          3419
 4979 ;          3420      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
 4980 ;          3421
 4981 ;          3422      ECC_DM = ZERO;                     !SET ERROR FLAG IF NEQ
 4982 ;          3423                                         !CLEAR ECC DIAG MODE
 4983 ;          3424      end;
 4987
 4988                                        .SBTTL  RD.E1
 4992 020652  004167  163166          RD.E1: JSR     R1,$SAVE2                    ;                          3364
 4993 020656  005076  000010                 CLR     @10(SP)                      ; ERR.FLG                  3415
 4994 020662  152777  000001  172404         BISB    #1,@ML.REG+120               ;                          3416
 4995 020670  016600  000012                 MOV     12(SP),R0                    ; INDEX,*                  3417
 4996 020674  006300                         ASL     R0
 4997 020676  006300                         ASL     R0
 4998 020700  006300                         ASL     R0
 4999 020702  010001                         MOV     R0,R1
 5000 020704  016100  013156                 MOV     ML.REG+2(R1),R0
 5001 020710  056600  000014                 BIS     14(SP),R0                    ; TST.PAT,*
 5002 020714  046100  013160                 BIC     ML.REG+4(R1),R0
 5003 020720  016102  013162                 MOV     ML.REG+6(R1),R2
 5004 020724  050002                         BIS     R0,R2
 5005 020726  010267  172174                 MOV     R2,WT.DATA
 5006 020732  017702  172366                 MOV     @ML.REG+150,R2               ;                          3418
 5007 020736  056102  013162                 BIS     ML.REG+6(R1),R2
 5008 020742  010267  172162                 MOV     R2,RD.DATA
 5009 020746  026767  172154  172154         CMP     WT.DATA,RD.DATA              ;                          3420
 5010 020754  001403                         BEQ     1$
 5011 020756  012776  000001  000010         MOV     #1,@10(SP)                   ; *,ERR.FLG
 5012 020764  142777  000001  172302  1$:    BICB    #1,@ML.REG+120               ;                          3422
 5013 020772  000207                         RTS     PC                           ;                          3364
 5014
 5015                                ; Routine Size:  41 words
 5016                                ; Maximum stack depth per invocation:  3 words
 5021
 5022
```

```
5024 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
5025 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (31)
5026
5027 ;          3425  routine WRT_E2 (TST_PAT, index) : novalue =
5028 ;          3426      begin
5029 ;          3427
5030 ;          3428  !++
5031 ;          3429  ! FUNCTIONAL DESCRIPTION:
5032 ;          3430  !
5033 ;          3431  !       LOADS THE ECC CRC WORD
5034 ;          3432  !       REGISTER 2 WITH A DATA PATTERN
5035 ;          3433  !       GENERATED BY THE MACRO
5036 ;          3434  !       WRT_MASK
5037 ;          3435  !
5038 ;          3436  ! FORMAL PARAMETERS:
5039 ;          3437  !
5040 ;          3438  !       TST_PAT
5041 ;          3439  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
5042 ;          3440  !
5043 ;          3441  !       INDEX
5044 ;          3442  !       USED BY THE MACRO WRT_MASK
5045 ;          3443  !       TO SELECT THE CURRENT REGISTERS
5046 ;          3444  !       ADDRESS, FORCED HI, FORCED
5047 ;          3445  !       LO AND DON'T CARE MASK
5048 ;          3446  !       INFORMATION.
5049 ;          3447  !
5050 ;          3448  !--
5051 ;          3449
5052 ;          3450      ECC_DM = ONE;                          !SET ECC DIAG MODE
5053 ;          3451      MLE2_MASK = %o'177700';                !MASK OUT DATA DIAG BITS
5054 ;          3452      MLE2 = WRT_MASK;                       !LOAD MLE2 WITH GENERATED WRT_MASK PATTERN
5055 ;          3453      MLE2_MASK = %o'000000';                !RESTORE MLE2_MASK
5056 ;          3454      ECC_DM = ZERO;                         !CLEAR ECC DIAG MODE
5057 ;          3455      end;
5061
5062                                          .SBTTL  WRT.E2
5066 020774  004167  163044          WRT.E2: JSR     R1,$SAVE2                       ;                       3425
5067 021000  152777  000001  172266          BISB    #1,@ML.REG+120                  ;                       3450
5068 021006  012767  177700  172326          MOV     #-100,ML.REG+166                ;                       3451
5069 021014  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3452
5070 021020  006300                          ASL     R0
5071 021022  006300                          ASL     R0
5072 021024  006300                          ASL     R0
5073 021026  010001                          MOV     R0,R1
5074 021030  016100  013156                  MOV     ML.REG+2(R1),R0
5075 021034  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
5076 021040  046100  013160                  BIC     ML.REG+4(R1),R0
5077 021044  016102  013162                  MOV     ML.REG+6(R1),R2
5078 021050  050002                          BIS     R0,R2
```

```
5080                            ;ML4                                                    14-May-1981 13:48:54    TOPS
5081                            ;                                                       14-May-1981 13:05:08    PA:<
5082
5083 021052  010277  172256                MOV     R2,@ML.REG+160
5084 021056  005067  172260                CLR     ML.REG+166                  ;                           3453
5085 021062  142777  000001  172204        BICB    #1,@ML.REG+120              ;                           3454
5086 021070  000207                        RTS     PC                          ;                           3425
5087
5088                            ; Routine Size:  31 words
5089                            ; Maximum stack depth per invocation:  3 words
5094
5095
```

```
5097 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
5098 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (32)
5099
5100 :          3456  routine RD_E2 (TST_PAT, index, ERR_FLG) : novalue =
5101 :          3457      begin
5102 :          3458
5103 :          3459  !++
5104 :          3460  ! FUNCTIONAL DESCRIPTION:
5105 :          3461  !
5106 :          3462  !       COMPARES THE CONTENTS OF THE
5107 :          3463  !       ECC CRC WORD REGISTER 2
5108 :          3464  !       WITH THE MASKED DATA PATTERN
5109 :          3465  !       GENERATED BY THE MACRO 'WRT_MASK'
5110 :          3466  !
5111 :          3467  !       IF THE COMPARE IS NOT EQUAL THEN
5112 :          3468  !       THE FORMAL PARAMETER 'ERR_FLG' IS
5113 :          3469  !       ASSIGNED A ONE TO INDICATE THE
5114 :          3470  !       ERROR.
5115 :          3471  !
5116 :          3472  ! FORMAL PARAMETERS:
5117 :          3473  !
5118 :          3474  !       TST_PAT
5119 :          3475  !       DATA PATTERN TO BE MASKED AND
5120 :          3476  !       COMPARED AGAINST THE CONTENTS
5121 :          3477  !       OF THE REGISTER UNDER TEST.
5122 :          3478  !
5123 :          3479  !       INDEX
5124 :          3480  !       USED BY THE MACRO WRT_MASK TO
5125 :          3481  !       SELECT THE CURRENT REGISTERS ADDRESS,
5126 :          3482  !       FORCED HI, FORCED LO AND DON'T CARE
5127 :          3483  !       MASK INFORMATION.
5128 :          3484  !
5129 :          3485  !       ERR_FLG
5130 :          3486  !       CONTAINS THE ADDRESS (PASSED BY REF)
5131 :          3487  !       OF THE CALLERS ERROR FLG TO ENABLE THE
5132 :          3488  !       CALLER TO EXAMINE THE ERROR STATUS
5133 :          3489  !       OF THE ROUTINE CALL.
5134 :          3490  !
5135 :          3491  ! IMPLICIT INPUTS:
5136 :          3492  !       WT_DATA
5137 :          3493  !         GETS LOADED WITH THE GENERATED
5138 :          3494  !         WRT_MASK DATA PATTERN THUS ALLOWING
5139 :          3495  !         CALLER TO PRINT FAILING GOOD DATA.
5140 :          3496  !
5141 :          3497  !       RD_DATA
5142 :          3498  !         GETS LOADED WITH DATA READ FROM THE
5143 :          3499  !         REGISTER THUS ALLOWING CALLER
5144 :          3500  !         TO PRINT FAILING BAD DATA.
5145 :          3501  !
5146 :          3502  ! IMPLICIT OUTPUTS:
5147 :          3503  !       GLOBAL LOCATION WR_DATA
5148 :          3504  !       AND RD_DATA LOADED WITH GOOD
5149 :          3505  !       AND BAD REGISTER DATA
5150 :          3506  !
5151 :          3507  !--
```

```
5153 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
5154 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (32)
5155
5156 ;          3508
5157 ;          3509        .ERR_FLG = ZERO;                 !CLEAR ERROR FLAG
5158 ;          3510        ECC_DM = ONE;                    !SET ECC DIAG MODE
5159 ;          3511        MLE2_MASK = %o'177700';          !MASK OUT DATA DIAG BITS
5160 ;          3512        WT_DATA = WRT_MASK;              !SAVE THE DATA WRITTEN TO THE REGISTER
5161 ;          3513        RD_DATA = .MLE2 or .IGNORE;      !READ AND SAVE THE REGISTER
5162 ;          3514
5163 ;          3515        if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
5164 ;          3516
5165 ;          3517                                         !SET ERROR FLG IF NEQ
5166 ;          3518        MLE2_MASK = %o'000000';          !RESTORE MLE2 MASK
5167 ;          3519        ECC_DM = ZERO;                   !CLEAR ECC DIAG MODE
5168 ;          3520        end;
5172
5173                                      .SBTTL  RD.E2
5177 021072  004167  162746          RD.E2:  JSR     R1,$SAVE2                       ;                       3456
5178 021076  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3509
5179 021102  152777  000001  172164          BISB    #1,@ML.REG+120                  ;                       3510
5180 021110  012767  177700  172224          MOV     #-100,ML.REG+166                ;                       3511
5181 021116  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3512
5182 021122  006300                          ASL     R0
5183 021124  006300                          ASL     R0
5184 021126  006300                          ASL     R0
5185 021130  010001                          MOV     R0,R1
5186 021132  016100  013156                  MOV     ML.REG+2(R1),R0
5187 021136  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
5188 021142  046100  013160                  BIC     ML.REG+4(R1),R0
5189 021146  016102  013162                  MOV     ML.REG+6(R1),R2
5190 021152  050002                          BIS     R0,R2
5191 021154  010267  171746                  MOV     R2,WT.DATA
5192 021160  017702  172150                  MOV     @ML.REG+160,R2                  ;                       3513
5193 021164  056102  013162                  BIS     ML.REG+6(R1),R2
5194 021170  010267  171734                  MOV     R2,RD.DATA
5195 021174  026767  171726  171726          CMP     WT.DATA,RD.DATA                 ;                       3515
5196 021202  001403                          BEQ     1$
5197 021204  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
5198 021212  005067  172124              1$: CLR     ML.REG+166                      ;                       3518
5199 021216  142777  000001  172050          BICB    #1,@ML.REG+120                  ;                       3519
5200 021224  000207                          RTS     PC                              ;                       3456
5201
5202                                 ; Routine Size:  46 words
5203                                 ; Maximum stack depth per invocation:  3 words
```

```
5209 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
5210 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (33)
5211
5212 :          3521  routine WRT_PD (TST_PAT, index) : novalue =
5213 :          3522      begin
5214 :          3523
5215 :          3524  !++
5216 :          3525  ! FUNCTIONAL DESCRIPTION:
5217 :          3526  !
5218 :          3527  !       LOADS THE PROM DATA
5219 :          3528  !       REGISTER WITH A DATA PATTERN
5220 :          3529  !       GENERATED BY THE MACRO
5221 :          3530  !       WRT_MASK
5222 :          3531  !
5223 :          3532  ! FORMAL PARAMETERS:
5224 :          3533  !
5225 :          3534  !       TST_PAT
5226 :          3535  !       CURRENT DATA PATTERN TO BE
5227 :          3536  !       LOADED IN THE REGISTER.
5228 :          3537  !
5229 :          3538  !       INDEX
5230 :          3539  !       USED BY THE MACRO WRT_MASK
5231 :          3540  !       TO SELECT THE CURRENT REGISTERS
5232 :          3541  !       ADDRESS, FORCED HI, FORCED
5233 :          3542  !       LO AND DON'T CARE MASK
5234 :          3543  !       INFORMATION
5235 :          3544  !
5236 :          3545  !--
5237 :          3546
5238 :          3547      PROM_RW = ONE;                     !SET PROM READ WRITE
5239 :          3548      DAT_DM = ONE;                      !SET DATA DIAG MODE
5240 :          3549      MLPD = WRT_MASK;                   !LOAD MLPD WITH GENERATED WRT_MASK PATTERN
5241 :          3550      DAT_CLK = ONE;                     !DO A DATA CLK
5242 :          3551      PROM_RW = ZERO;                    !CLEAR PROM READ WRITE
5243 :          3552      DAT_DM = ZERO;                     !CLEAR DATA DIAG MODE
5244 :          3553      end;
5248
5249                                        .SBTTL  WRT.PD
5253 021226  004167  162612          WRT.PD: JSR     R1,$SAVE2                       ;                       3521
5254 021232  152777  000100  172034          BISB    #100,@ML.REG+120                ;                       3547
5255 021240  152777  000010  172026          BISB    #10,@ML.REG+120                 ;                       3548
5256 021246  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3549
5257 021252  006300                          ASL     R0
5258 021254  006300                          ASL     R0
5259 021256  006300                          ASL     R0
5260 021260  010001                          MOV     R0,R1
5261 021262  016100  013156                  MOV     ML.REG+2(R1),R0
5262 021266  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
5263 021272  046100  013160                  BIC     ML.REG+4(R1),R0
```

```
5265                                    ;ML4                                                    14-May-1981 13:48:54    TOPS
5266                                    ;                                                       14-May-1981 13:05:08    PA:<
5267
5268 021276  016102  013162                       MOV     ML.REG+6(R1),R2
5269 021302  050002                              BIS     R0,R2
5270 021304  010277  172074                       MOV     R2,@ML.REG+230
5271 021310  152777  000020  171756               BISB    #20,@ML.REG+120                 ;       3550
5272 021316  142777  000100  171750               BICB    #100,@ML.REG+120                ;       3551
5273 021324  142777  000010  171742               BICB    #10,@ML.REG+120                 ;       3552
5274 021332  000207                              RTS     PC                              ;       3521
5275
5276                                    ; Routine Size:  35 words
5277                                    ; Maximum stack depth per invocation:  3 words
5282
5283
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (34)

;          3554  routine RD_PD (TST_PAT, index, ERR_FLG) : novalue =
;          3555      begin
;          3556
;          3557  !++
;          3558  ! FUNCTIONAL DESCRIPTION:
;          3559  !
;          3560  !       COMPARES THE CONTENTS OF THE
;          3561  !       PROM DATA REGISTER
;          3562  !       WITH THE MASKED DATA PATTERN
;          3563  !       GENERATED BY THE MACRO 'WRT_MASK'
;          3564  !
;          3565  !       IF THE COMPARE IS NOT EQUAL THEN
;          3566  !       THE FORMAL PARAMETER 'ERR FLG' IS
;          3567  !       ASSIGNED A ONE TO INDICATE THE
;          3568  !       ERROR
;          3569  !
;          3570  ! FORMAL PARAMETERS:
;          3571  !
;          3572  !       TST_PAT
;          3573  !       DATA PATTERN TO BE MASKED AND
;          3574  !       COMPARED AGAINST THE CONTENTS
;          3575  !       OF THE REGISTER UNDER TEST
;          3576  !
;          3577  !       INDEX
;          3578  !       USED BY THE MACRO WRT_MASK TO
;          3579  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3580  !       FORCED HI, FORCED LO AND DON'T CARE
;          3581  !       MASK INFORMATION.
;          3582  !
;          3583  !       ERR_FLG
;          3584  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          3585  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          3586  !       CALLER TO EXAMINE THE ERROR STATUS
;          3587  !       OF THE ROUTINE CALL.
;          3588  !
;          3589  ! IMPLICIT INPUTS:
;          3590  !       WT_DATA
;          3591  !         GETS LOADED WITH THE GENERATED
;          3592  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          3593  !         CALLER TO PRINT FAILING GOOD DATA.
;          3594  !
;          3595  !       RD_DATA
;          3596  !         GETS LOADED WITH DATA READ FROM THE
;          3597  !         REGISTER THUS ALLOWING CALLER
;          3598  !         TO PRINT FAILING BAD DATA.
;          3599  !
;          3600  ! IMPLICIT OUTPUTS:
;          3601  !       GLOBAL LOCATION WR_DATA
;          3602  !       AND RD_DATA LOADED WITH GOOD
;          3603  !       AND BAD REGISTER DATA
;          3604  !
;          3605  !--
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (34)

;          3606
;          3607        .ERR_FLG = ZERO;                !CLEAR ERROR FLG
;          3608        PROM_RW = ONE;                  !SET PROM READ WRITE
;          3609        DAT_DM = ONE;                   !SET DATA DIAG MODE
;          3610        WT_DATA = WRT_MASK;             !SAVE THE DATA WRITTEN TO THE REGISTER
;          3611        RD_DATA = .MLPD or .IGNORE;     !READ AND SAVE THE REGISTER
;          3612
;          3613        if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3614
;          3615                                        !SET ERROR FLAG IF NEQ
;          3616        PROM_RW = ZERO;                 !CLEAR PROM READ WRTE
;          3617        DAT_DM = ZERO;                  !CLEAR DATA DIAG MODE
;          3618        end;

                                    .SBTTL  RD.PD
021334  004167  162504       RD.PD: JSR     R1,$SAVE2                    ;                          3554
021340  005076  000010              CLR     @10(SP)                      ; ERR.FLG                  3607
021344  152777  000100  171722      BISB    #100,@ML.REG+120             ;                          3608
021352  152777  000010  171714      BISB    #10,@ML.REG+120              ;                          3609
021360  016600  000012              MOV     12(SP),R0                    ; INDEX,*                  3610
021364  006300                      ASL     R0
021366  006300                      ASL     R0
021370  006300                      ASL     R0
021372  010001                      MOV     R0,R1
021374  016100  013156              MOV     ML.REG+2(R1),R0
021400  056600  000014              BIS     14(SP),R0                    ; TST.PAT,*
021404  046100  013160              BIC     ML.REG+4(R1),R0
021410  016102  013162              MOV     ML.REG+6(R1),R2
021414  050002                      BIS     R0,R2
021416  010267  171504              MOV     R2,WT.DATA
021422  017702  171756              MOV     @ML.REG+230,R2               ;                          3611
021426  056102  013162              BIS     ML.REG+6(R1),R2
021432  010267  171472              MOV     R2,RD.DATA
021436  026767  171464  171464      CMP     WT.DATA,RD.DATA              ;                          3613
021444  001403                      BEQ     1$
021446  012776  000001  000010      MOV     #1,@10(SP)                   ; *,ERR.FLG
021454  142777  000100  171612 1$:  BICB    #100,@ML.REG+120             ;                          3616
021462  142777  000010  171604      BICB    #10,@ML.REG+120              ;                          3617
021470  000207                      RTS     PC                           ;                          3554

                        ; Routine Size:  47 words
                        ; Maximum stack depth per invocation:  3 words
```

```
5397 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
5398 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (35)
5399
5400 :          3619  routine WRT_EL (TST_PAT, index) : novalue =
5401 :          3620      begin
5402 :          3621
5403 :          3622  !++
5404 :          3623  ! FUNCTIONAL DESCRIPTION:
5405 :          3624  !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
5406 :          3625  !       WRITE REGISTER ALGORITHEM
5407 :          3626  !
5408 :          3627  ! FORMAL PARAMETERS:
5409 :          3628  !       TST_PAT
5410 :          3629  !       DATA PATTERN TO BE MASKED AND
5411 :          3630  !       COMPARED AGAINST THE CONTENTS
5412 :          3631  !       OF THE REGISTER UNDER TEST
5413 :          3632  !
5414 :          3633  !       INDEX
5415 :          3634  !       USED BY THE MACRO WRT_MASK TO
5416 :          3635  !       SELECT THE CURRENT REGISTERS ADDRESS,
5417 :          3636  !       FORCED HI, FORCED LO AND DON'T CARE
5418 :          3637  !       MASK INFORMATION.
5419 :          3638  !
5420 :          3639  !--
5421 :          3640
5422 :          3641  !
5423 :          3642  !  ERROR LOCATION REG IS READ ONLY
5424 :          3643      return;
5425 :          3644      end;
5429
5430                                        .SBTTL  WRT.EL
5434 021472  000207                WRT.EL: RTS     PC                      ;                       3619
5435
5436                                ; Routine Size:  1 word
5437                                ; Maximum stack depth per invocation:  0 words
5442
5443
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (36)

;          3645  routine RD_EL (TST_PAT, index, ERR_FLG) : novalue =
;          3646      begin
;          3647
;          3648  !++
;          3649  ! FUNCTIONAL DESCRIPTION:
;          3650  !
;          3651  !       COMPARES THE CONTENTS OF THE
;          3652  !       ERROR LOCATION REGISTER
;          3653  !       WITH THE CONTENTS OF TST_PAT.
;          3654  !
;          3655  !       IF THE COMPARE IS NOT EQUAL THEN
;          3656  !       THE FORMAL PARAMETER 'ERR FLG' IS
;          3657  !       ASSIGNED A ONE TO INDICATE THE
;          3658  !       ERROR
;          3659  !
;          3660  ! FORMAL PARAMETERS:
;          3661  !       TST_PAT
;          3662  !       DATA PATTERN TO BE MASKED AND
;          3663  !       COMPARED AGAINST THE CONTENTS
;          3664  !       OF THE REGISTER UNDER TEST
;          3665  !
;          3666  !       INDEX
;          3667  !       USED BY THE MACRO WRT_MASK TO
;          3668  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3669  !       FORCED HI, FORCED LO AND DON'T CARE
;          3670  !       MASK INFORMATION.
;          3671  !
;          3672  !       ERR_FLG
;          3673  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          3674  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          3675  !       CALLER TO EXAMINE THE ERROR STATUS
;          3676  !       OF THE ROUTINE CALL.
;          3677  !
;          3678  ! IMPLICIT INPUTS:
;          3679  !       WT_DATA
;          3680  !         GETS LOADED WITH THE GENERATED
;          3681  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          3682  !         CALLER TO PRINT FAILING GOOD DATA.
;          3683  !
;          3684  !       RD_DATA
;          3685  !         GETS LOADED WITH DATA READ FROM THE
;          3686  !         REGISTER THUS ALLOWING CALLER
;          3687  !         TO PRINT FAILING BAD DATA.
;          3688  !
;          3689  ! IMPLICIT OUTPUTS:
;          3690  !       GLOBAL LOCATION WR_DATA
;          3691  !       AND RD_DATA LOADED WITH GOOD
;          3692  !       AND BAD REGISTER DATA
;          3693  !
;          3694  !--
;          3695
;          3696      .ERR_FLG = ZERO;
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (36)

;          3697      WT_DATA = .TST_PAT;                !SAVE THE DATA WRITTEN TO THE REGISTER
;          3698      RD_DATA = .MLEC;                   !READ AND SAVE THE REGISTER
;          3699
;          3700      if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ REGISTER FOR WT_DATA
;          3701
;          3702      end;

                                    .SBTTL  RD.EL
021474  005076  000002          RD.EL:  CLR     @2(SP)                  ; ERR.FLG                       3696
021500  016667  000006  171420          MOV     6(SP),WT.DATA           ; TST.PAT,*                     3697
021506  017767  171662  171414          MOV     @ML.REG+220,RD.DATA     ;                               3698
021514  026767  171410  171404          CMP     RD.DATA,WT.DATA         ;                               3700
021522  001403                          BEQ     1$
021524  012776  000001  000002          MOV     #1,@2(SP)               ; *,ERR.FLG
021532  000207                  1$:     RTS     PC                      ;                               3645

                                ; Routine Size:  16 words
                                ; Maximum stack depth per invocation:  0 words
```

```
:ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
:                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (37)

:          3703  routine WRT_EE (TST_PAT, index) : novalue =
:          3704      begin
:          3705
:          3706  !++
:          3707  ! FUNCTIONAL DESCRIPTION:
:          3708  !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
:          3709  !       WRITE REGISTER ALGORITHEM
:          3710  !
:          3711  ! FORMAL PARAMETERS:
:          3712  !       TST_PAT
:          3713  !       DATA PATTERN TO BE MASKED AND
:          3714  !       COMPARED AGAINST THE CONTENTS
:          3715  !       OF THE REGISTER UNDER TEST
:          3716  !
:          3717  !       INDEX
:          3718  !       USED BY THE MACRO WRT_MASK TO
:          3719  !       SELECT THE CURRENT REGISTERS ADDRESS,
:          3720  !       FORCED HI, FORCED LO AND DON'T CARE
:          3721  !       MASK INFORMATION.
:          3722  !
:          3723  !--
:          3724
:          3725  ! ECC ERROR REGISTER IS READ ONLY
:          3726      return;
:          3727      end;


                                .SBTTL  WRT.EE
021534  000207          WRT.EE: RTS     PC                      ;               3703

                        ; Routine Size:  1 word
                        ; Maximum stack depth per invocation:  0 words
```

```
5582 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
5583 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (38)
5584 ;
5585 ;          3728  routine RD_EE (TST_PAT, index, ERR_FLG) : novalue =
5586 ;          3729      begin
5587 ;          3730
5588 ;          3731  !++
5589 ;          3732  ! FUNCTIONAL DESCRIPTION:
5590 ;          3733  !
5591 ;          3734  !       COMPARES THE CONTENTS OF THE
5592 ;          3735  !       ECC ERROR REGISTER WITH TST_PAT.
5593 ;          3736  !
5594 ;          3737  !       IF THE COMPARE IS NOT EQUAL THEN
5595 ;          3738  !       THE FORMAL PARAMETER 'ERR_FLG" IS
5596 ;          3739  !       ASSIGNED A ONE TO INDICATE THE
5597 ;          3740  !       ERROR.
5598 ;          3741  !
5599 ;          3742  ! FORMAL PARAMETERS:
5600 ;          3743  !       TST_PAT
5601 ;          3744  !       DATA PATTERN TO BE
5602 ;          3745  !       COMPARED AGAINST THE CONTENTS
5603 ;          3746  !       OF THE REGISTER UNDER TEST.
5604 ;          3747  !
5605 ;          3748  !       INDEX
5606 ;          3749  !       USED BY THE MACRO MLEE TO
5607 ;          3750  !       SELECT THE CURRENT REGISTERS ADDRESS.
5608 ;          3751  !
5609 ;          3752  !       ERR_FLG
5610 ;          3753  !       CONTAINS THE ADDRESS (PASSED
5611 ;          3754  !       BY REF) OF THE CALLERS ERROR FLG TO ENABLE
5612 ;          3755  !       THE CALLER TO EXAMINE THE ERROR STATUS
5613 ;          3756  !       OF THE ROUTINE CALL.
5614 ;          3757  !
5615 ;          3758  ! IMPLICIT INPUTS:
5616 ;          3759  !       WT_DATA
5617 ;          3760  !         GETS LOADED WITH THE TST_PAT
5618 ;          3761  !         THUS ALLOWING CALLER TO PRINT
5619 ;          3762  !         THE FAILING DATA.
5620 ;          3763  !
5621 ;          3764  !       RD_DATA
5622 ;          3765  !         GETS LOADED WITH DATA READ FROM THE
5623 ;          3766  !         REGISTER THUS ALLOWING CALLER
5624 ;          3767  !         TO PRINT FAILING BAD DATA.
5625 ;          3768  !
5626 ;          3769  ! IMPLICIT OUTPUTS:
5627 ;          3770  !       GLOBAL LOCATION WR_DATA
5628 ;          3771  !       AND RD_DATA LOADED WITH GOOD
5629 ;          3772  !       AND BAD REGISTER DATA
5630 ;          3773  !
5631 ;          3774  !--
5632 ;          3775
5633 ;          3776      .ERR_FLG = ZERO;                    !CLEAR THE ERROR FLAG
5634 ;          3777      WT_DATA = .TST_PAT;                 !SAVE DATA WRITTEN TO THE REGISTER
5635 ;          3778      RD_DATA = .MLEE;                    !READ AND SAVE THE REGISTER
5636 ;          3779
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (38)

;          3780      if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ MLEE FOR TST_PAT
;          3781
;          3782                                                          !SET THE ERROR FLAG IF NEQ
;          3783      end;


                                    .SBTTL  RD.EE
021536  005076  000002          RD.EE:  CLR     @2(SP)                          ; ERR.FLG                       3776
021542  016667  000006  171356          MOV     6(SP),WT.DATA                   ; TST.PAT,*                     3777
021550  017767  171610  171352          MOV     @ML.REG+210,RD.DATA             ;                               3778
021556  026767  171346  171342          CMP     RD.DATA,WT.DATA                 ;                               3780
021564  001403                          BEQ     1$
021566  012776  000001  000002          MOV     #1,@2(SP)                       ; *,ERR.FLG
021574  000207                  1$:     RTS     PC                              ;                               3728

                                ; Routine Size:  16 words
                                ; Maximum stack depth per invocation:  0 words
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (39)

;          3784  routine WRT_D1 (TST_PAT, index) : novalue =
;          3785      begin
;          3786
;          3787  !++
;          3788  ! FUNCTIONAL DESCRIPTION:
;          3789  !       LOADS THE DATA DIAG REG 1 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;          3790  ! FORMAL PARAMETERS:
;          3791  !       TST_PAT
;          3792  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3793  !       INDEX
;          3794  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3795  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3796  !--
;          3797
;          3798      DAT_DM = ONE;                                 !SET DATA DIAG MODE
;          3799      MLDT = WRT_MASK;                              !LOAD MLD1 WITH GENERATED WRT_MASK PATTERN
;          3800      DAT_DM = ZERO;                                !CLEAR DATA DIAG MODE
;          3801      end;

                                        .SBTTL  WRT.D1
021576  004167  162242          WRT.D1: JSR     R1,$SAVE2                       ;                       3784
021602  152777  000010  171464          BISB    #10,@ML.REG+120                 ;                       3798
021610  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3799
021614  006300                          ASL     R0
021616  006300                          ASL     R0
021620  006300                          ASL     R0
021622  010001                          MOV     R0,R1
021624  016100  013156                  MOV     ML.REG+2(R1),R0
021630  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
021634  046100  013160                  BIC     ML.REG+4(R1),R0
021640  016102  013162                  MOV     ML.REG+6(R1),R2
021644  050002                          BIS     R0,R2
021646  010277  171472                  MOV     R2,@ML.REG+170
021652  142777  000010  171414          BICB    #10,@ML.REG+120                 ;                       3800
021660  000207                          RTS     PC                              ;                       3784

                                ; Routine Size:  26 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (40)

;          3802  routine RD_D1 (TST_PAT, index, ERR_FLG) : novalue =
;          3803      begin
;          3804
;          3805  !++
;          3806  ! FUNCTIONAL DESCRIPTION:
;          3807  !
;          3808  !       COMPARES THE CONTENTS OF THE
;          3809  !       DATA DIAG REGISTER 1
;          3810  !       WITH THE MASKED DATA PATTERN
;          3811  !       GENERATED BY THE MACRO 'WRT_MASK".
;          3812  !
;          3813  !       IF THE COMPARE IS NOT EQUAL THEN
;          3814  !       THE FORMAL PARAMETER 'ERR_FLG" IS
;          3815  !       ASSIGNED A ONE TO INDICATE THE
;          3816  !       ERROR.
;          3817  !
;          3818  ! FORMAL PARAMETERS:
;          3819  !
;          3820  !       TST_PAT
;          3821  !       DATA PATTERN TO BE MASKED AND
;          3822  !       COMPARED AGAINST THE CONTENTS
;          3823  !       OF THE REGISTER UNDER TEST.
;          3824  !
;          3825  !       INDEX
;          3826  !       USED BY THE MACRO WRT_MASK TO
;          3827  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3828  !       FORCED HI, FORCED LO AND DON'T CARE
;          3829  !       MASK INFORMATION.
;          3830  !
;          3831  !       ERR_FLG
;          3832  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          3833  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          3834  !       CALLER TO EXAMINE THE ERROR STATUS
;          3835  !       OF THE ROUTINE CALL.
;          3836  !
;          3837  ! IMPLICIT INPUTS:
;          3838  !       WT_DATA
;          3839  !         GETS LOADED WITH THE GENERATED
;          3840  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          3841  !         CALLER TO PRINT FAILING GOOD DATA.
;          3842  !
;          3843  !       RD_DATA
;          3844  !         GETS LOADED WITH DATA READ FROM THE
;          3845  !         REGISTER THUS ALLOWING CALLER
;          3846  !         TO PRINT FAILING BAD DATA.
;          3847  !
;          3848  ! IMPLICIT OUTPUTS:
;          3849  !       GLOBAL LOCATION WR_DATA
;          3850  !       AND RD_DATA LOADED WITH GOOD
;          3851  !       AND BAD REGISTER DATA
;          3852  !
;          3853  !--
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (40)

;ML4
;
;          3854
;          3855       .ERR_FLG = ZERO;                             !CLEAR THE ERROR FLG
;          3856       DAT_DM = ONE;                                !SET DATA DIAG MODE
;          3857       ML_FUNC = write;                             !LOAD MLCS1 WITH WRITE FUNCTION
;          3858       DAT_CLK = ONE;                               !DO A DATA CLK
;          3859
;          3860       if .REG_INIT_FLG IS_SET                      !SEE IF CALLER IS REG INIT TEST
;          3861                                                    !SET ERROR FLAG IF NEQ
;          3862       then
;          3863           begin
;          3864           CLR_MBUS;                                !CLEAR MBUS TO GENERATE INIT DATA
;          3865           DAT_DM = ONE;
;          3866           end;
;          3867
;          3868       WT_DATA = WRT_MASK;                          !SAVE THE DATA WRITTEN TO THE REGISTER
;          3869       RD_DATA = .ML01;                             !READ AND SAVE THE REGISTER
;          3870
;          3871       if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ ML01 FOR WRT_MASK
;          3872
;          3873                                                    !SET ERR_FLG IF NEQ
;          3874       CLR_MBUS;                                    !CLEAR THE MBUS
;          3875       end;
5808
5809                                .SBTTL  RD.D1
5813 021662  004167  162156       RD.D1:  JSR     R1,$SAVE2                   ;                                   3802
5814 021666  005076  000010               CLR     @10(SP)                     ; ERR.FLG                           3855
5815 021672  152777  000010  171374       BISB    #10,@ML.REG+120             ;                                   3856
5816 021700  142777  000077  171246       BICB    #77,@ML.REG                 ;                                   3857
5817 021706  152777  000061  171240       BISB    #61,@ML.REG
5818 021714  152777  000020  171352       BISB    #20,@ML.REG+120             ;                                   3858
5819 021722  026727  171210  000001       CMP     REG.INIT.FLG,#1             ;                                   3860
5820 021730  001017                       BNE     1$
5821 021732  152777  000040  171254       BISB    #40,@ML.REG+40              ;                                   3863
5822 021740  016701  171636               MOV     ML.DUT,R1
5823 021744  042701  177770               BIC     #177770,R1
5824 021750  142777  000007  171236       BICB    #7,@ML.REG+40
5825 021756  150177  171232               BISB    R1,@ML.REG+40
5826 021762  152777  000010  171304       BISB    #10,@ML.REG+120             ;                                   3865
5827 021770  016600  000012         1$:   MOV     12(SP),R0                   ; INDEX,*                           3868
5828 021774  006300                       ASL     R0
5829 021776  006300                       ASL     R0
5830 022000  006300                       ASL     R0
5831 022002  010001                       MOV     R0,R1
5832 022004  016100  013156               MOV     ML.REG+2(R1),R0
5833 022010  056600  000014               BIS     14(SP),R0                   ; TST.PAT,*
5834 022014  046100  013160               BIC     ML.REG+4(R1),R0
```

```
5836                                    ;ML4                                                    14-May-1981 13:48:54    TOPS
5837                                    ;                                                       14-May-1981 13:05:08    PA:<
5838
5839 022020  016102  013162                      MOV     ML.REG+6(R1),R2
5840 022024  050002                              BIS     R0,R2
5841 022026  010267  171074                      MOV     R2,WT.DATA
5842 022032  017767  171306  171070              MOV     @ML.REG+170,RD.DATA             ;                       3869
5843 022040  026767  171064  171060              CMP     RD.DATA,WT.DATA                 ;                       3871
5844 022046  001403                              BEQ     2$
5845 022050  012776  000001  000010              MOV     #1,@10(SP)                      ; *,ERR.FLG
5846 022056  152777  000040  171130  2$:         BISB    #40,@ML.REG+40
5847 022064  016702  171512                      MOV     ML.DUT,R2
5848 022070  042702  177770                      BIC     #177770,R2
5849 022074  142777  000007  171112              BICB    #7,@ML.REG+40
5850 022102  150277  171106                      BISB    R2,@ML.REG+40
5851 022106  000207                              RTS     PC                              ;                       3802
5852
5853                                    ; Routine Size:  75 words
5854                                    ; Maximum stack depth per invocation:  3 words
5859
5860
```

```
5862 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
5863 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (41)
5864
5865 ;          3876  routine WRT_D2 (TST_PAT, index) : novalue =
5866 ;          3877      begin
5867 ;          3878
5868 ;          3879  !++
5869 ;          3880  ! FUNCTIONAL DESCRIPTION:
5870 ;          3881  !       LOADS THE DATA DIAG REG 2 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
5871 ;          3882  ! FORMAL PARAMETERS:
5872 ;          3883  !       TST_PAT
5873 ;          3884  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
5874 ;          3885  !       INDEX
5875 ;          3886  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
5876 ;          3887  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
5877 ;          3888  !--
5878 ;          3889
5879 ;          3890      DAT_DM = ONE;                          !SET DATA DIAG MODE
5880 ;          3891      MLD2 = WRT_MASK;                       !LOAD MLD2 WITH GENERATED WRT_MASK PATTERN
5881 ;          3892      DAT_DM = ZERO;                         !CLEAR DATA DIAG MODE
5882 ;          3893      end;
5886
5887                                        .SBTTL  WRT.D2
5891 022110  004167  161730          WRT.D2: JSR     R1,$SAVE2                       ;                       3876
5892 022114  152777  000010  171152          BISB    #10,@ML.REG+120                 ;                       3890
5893 022122  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3891
5894 022126  006300                          ASL     R0
5895 022130  006300                          ASL     R0
5896 022132  006300                          ASL     R0
5897 022134  010001                          MOV     R0,R1
5898 022136  016100  013156                  MOV     ML.REG+2(R1),R0
5899 022142  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
5900 022146  046100  013160                  BIC     ML.REG+4(R1),R0
5901 022152  016102  013162                  MOV     ML.REG+6(R1),R2
5902 022156  050002                          BIS     R0,R2
5903 022160  010277  171170                  MOV     R2,@ML.REG+200
5904 022164  142777  000010  171102          BICB    #10,@ML.REG+120                 ;                       3892
5905 022172  000207                          RTS     PC                              ;                       3876
5906
5907                                ; Routine Size:  26 words
5908                                ; Maximum stack depth per invocation:  3 words
5913
5914
```

```
5916 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
5917 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (42)
5918 ;
5919 ;          3894  routine RD_D2 (TST_PAT, index, ERR_FLG) : novalue =
5920 ;          3895      begin
5921 ;          3896
5922 ;          3897  !++
5923 ;          3898  ! FUNCTIONAL DESCRIPTION:
5924 ;          3899  !
5925 ;          3900  !       COMPARE THE CONTENTS OF THE
5926 ;          3901  !       DATA DIAG REGISTER 2
5927 ;          3902  !       WITH THE MASKED DATA PATTERN
5928 ;          3903  !       GENERATED BY THE MACRO "WRT_MASK".
5929 ;          3904  !       IF THE COMPARE IS NOT EQUAL THEN THE
5930 ;          3905  !       FORMAL PARAMETER "ERR_FLG" IS
5931 ;          3906  !       ASSIGNED A ONE TO INDICATE THE
5932 ;          3907  !       ERROR.
5933 ;          3908  !
5934 ;          3909  ! FORMAL PARAMETERS:
5935 ;          3910  !
5936 ;          3911  !       TST_PAT
5937 ;          3912  !       DATA PATTERN TO BE MASKED AND
5938 ;          3913  !       COMPARED AGAINST THE CONTENTS
5939 ;          3914  !       OF THE REGISTER UNDER TEST.
5940 ;          3915  !
5941 ;          3916  !       INDEX
5942 ;          3917  !       USED BY THE MACRO WRT_MASK TO
5943 ;          3918  !       SELECT THE CURRENT REGISTERS ADDRESS,
5944 ;          3919  !       FORCED HI, FORCED LO AND DON'T CARE
5945 ;          3920  !       MASK INFOMATION.
5946 ;          3921  !
5947 ;          3922  !       ERR_FLG
5948 ;          3923  !       CONTAINS THE ADDRESS (PASSED BY REF)
5949 ;          3924  !       OF THE CALLERS ERROR FLG TO ENABLE THE
5950 ;          3925  !       CALLER TO EXAMINE THE ERROR STATUS
5951 ;          3926  !       OF THE ROUTINE CALL.
5952 ;          3927  !
5953 ;          3928  ! IMPLICIT INPUTS:
5954 ;          3929  !       WT_DATA
5955 ;          3930  !         GETS LOADED WITH THE GENERATED
5956 ;          3931  !         WRT_MASK DATA PATTERN THUS ALLOWING
5957 ;          3932  !         CALLER TO PRINT FAILING GOOD DATA.
5958 ;          3933  !
5959 ;          3934  !       RD_DATA
5960 ;          3935  !         GETS LOADED WITH DATA READ FROM THE
5961 ;          3936  !         REGISTER THUS ALLOWING CALLER
5962 ;          3937  !         TO PRINT FAILING BAD DATA.
5963 ;          3938  !
5964 ;          3939  ! IMPLICIT OUTPUTS:
5965 ;          3940  !       GLOBAL LOCATION WR_DATA
5966 ;          3941  !       AND RD_DATA LOADED WITH GOOD
5967 ;          3942  !       AND BAD REGISTER DATA
5968 ;          3943  !
5969 ;          3944  !--
5970 ;          3945
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    FA:<NEALE>ML4.BLI.7 (42)

;          3946      .ERR_FLG = ZERO;                   !CLEAR ERROR FLAG
;          3947      DAT_DM = ONE;                      !SET DATA DIAG MODE
;          3948      ML_FUNC = write;                   !LOAD WRITE FUNC TO CS1
;          3949      DAT_CLK = ONE;                     !DO A DATA CLOCK
;          3950
;          3951      if .REG_INIT_FLG IS_SET            !SEE IF CALLER IS REG INIT TEST
;          3952      then                               !CLEAR MBUS TO GENERATE INIT DATA
;          3953          begin
;          3954          CLR_MBUS;
;          3955          DAT_DM = ONE;
;          3956          end;
;          3957
;          3958      WT_DATA = WRT_MASK;                !SAVE THE DATA WRITTEN TO THE REGISTER
;          3959      RD_DATA = .MLD2;                   !READ AND SAVE THE REGISTER
;          3960
;          3961      if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ MLD2 FR WRT_MASK PATTERN
;          3962
;          3963                                         !SET ERROR FLAG IF NEQ
;          3964      CLR_MBUS;                          !CLR MASS BUSS
;          3965      end;
;
;                                    .SBTTL  RD.D2
;3003 022174 004167 161644           RD.D2:  JSR     R1,$SAVE2                   ;                   3894
;3004 022200 005076 000010                   CLR     @10(SP)                     ; ERR.FLG           3946
;3005 022204 152777 000010 171062            BISB    #10,@ML.REG+120             ;                   3947
;3006 022212 142777 000077 170734            BICB    #77,@ML.REG                 ;                   3948
;3007 022220 152777 000061 170726            BISB    #61,@ML.REG
;3008 022226 152777 000020 171040            BISB    #20,@ML.REG+120             ;                   3949
;3009 022234 026727 170676 000001            CMP     REG.INIT.FLG,#1             ;                   3951
;3010 022242 001017                          BNE     1$
;3011 022244 152777 000040 170742            BISB    #40,@ML.REG+40              ;                   3953
;3012 022252 016701 171324                   MOV     ML.DUT,R1
;3013 022256 042701 177770                   BIC     #177770,R1
;3014 022262 142777 000007 170724            BICB    #7,@ML.REG+40
;3015 022270 150177 170720                   BISB    R1,@ML.REG+40
;3016 022274 152777 000010 170772            BISB    #10,@ML.REG+120             ;                   3955
;3017 022302 016600 000012           1$:     MOV     12(SP),R0                   ; INDEX,*           3958
;3018 022306 006300                          ASL     R0
;3019 022310 006300                          ASL     R0
;3020 022312 006300                          ASL     R0
;3021 022314 010001                          MOV     R0,R1
;3022 022316 016100 013156                   MOV     ML.REG+2(R1),R0
;3023 022322 056600 000014                   BIS     14(SP),R0                   ; TST.PAT,*
;3024 022326 046100 013160                   BIC     ML.REG+4(R1),R0
;3025 022332 016102 013162                   MOV     ML.REG+6(R1),R2
;3026 022336 050002                          BIS     R0,R2
```

```
6028                                    ;ML4                                                    14-May-1981 13:48:54    TOPS
6029                                    ;                                                       14-May-1981 13:05:08    PA:<
6030
6031  022340  010267  170562                      MOV     R2,WT.DATA
6032  022344  017767  171004  170556              MOV     @ML.REG+200,RD.DATA             ;                       3959
6033  022352  026767  170552  170546              CMP     RD.DATA,WT.DATA                 ;                       3961
6034  022360  001403                              BEQ     2$
6035  022362  012776  000001  000010              MOV     #1,@10(SP)                      ; *,ERR.FLG
6036  022370  152777  000040  170616  2$:         BISB    #40,@ML.REG+40
6037  022376  016702  171200                      MOV     ML.DUT,R2
6038  022402  042702  177770                      BIC     #177770,R2
6039  022406  142777  000007  170600              BICB    #7,@ML.REG+40
6040  022414  150277  170574                      BISB    R2,@ML.REG+40
6041  022420  000207                              RTS     PC                              ;                       3894
6042
6043                                    ; Routine Size:  75 words
6044                                    ; Maximum stack depth per invocation:  3 words
6049
6050
```

```
6052 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
6053 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (43)
6054
6055 ;          3966  routine WRT_D3 (TST_PAT, index) : novalue =
6056 ;          3967      begin
6057 ;          3968
6058 ;          3969  !++
6059 ;          3970  ! FUNCTIONAL DESCRIPTION:
6060 ;          3971  !
6061 ;          3972  !       LOADS THE DATA DIAG
6062 ;          3973  !       REGISTER 3 WITH A DATA PATTERN
6063 ;          3974  !       GENERATED BY THE MACRO
6064 ;          3975  !       WRT_MASK.
6065 ;          3976  !
6066 ;          3977  ! FORMAL PARAMETERS:
6067 ;          3978  !
6068 ;          3979  !       TST_PAT
6069 ;          3980  !       CURRENT DATA PATTERN TO BE
6070 ;          3981  !       LOADED IN THE REGISTER.
6071 ;          3982  !
6072 ;          3983  !       INDEX
6073 ;          3984  !       USE BY THE MACRO WRT_MASK
6074 ;          3985  !       TO SELECT THE CURRENT REGISTERS
6075 ;          3986  !       ADDRESS, FORCED HI, FORCED
6076 ;          3987  !       LO AND DON'T CARE MASK
6077 ;          3988  !       INFORMATION.
6078 ;          3989  !
6079 ;          3990  !--
6080 ;          3991
6081 ;          3992      DAT_DM = ONE;                          !SET DATA DIAG MODE
6082 ;          3993      MLE2_MASK = %o'000377';                !MASK OUT ECC CRC WORD BITS
6083 ;          3994      MLE2 = WRT_MASK;                       !LOAD MLE2 WITH GENERATED WRT_MASK PATTERN
6084 ;          3995      MLE2_MASK = %o'100300';                !RESTORE MASK
6085 ;          3996      DAT_DM = ZERO;                         !CLEAR DATA DIAG MODE.
6086 ;          3997      end;
6090
6091                                        .SBTTL  WRT.D3
6095 022422  004167  161416          WRT.D3: JSR     R1,$SAVE2                       ;                       3966
6096 022426  152777  000010  170640          BISB    #10,@ML.REG+120                 ;                       3992
6097 022434  012767  000377  170700          MOV     #377,ML.REG+166                 ;                       3993
6098 022442  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3994
6099 022446  006300                          ASL     R0
6100 022450  006300                          ASL     R0
6101 022452  006300                          ASL     R0
6102 022454  010001                          MOV     R0,R1
6103 022456  016100  013156                  MOV     ML.REG+2(R1),R0
6104 022462  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
6105 022466  046100  013160                  BIC     ML.REG+4(R1),R0
6106 022472  016102  013162                  MOV     ML.REG+6(R1),R2
```

```
 6108                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
 6109                                   ;                                                       14-May-1981 13:05:08    PA:<
 6110
 6111 022476  050002                              BIS     R0,R2
 6112 022500  010277  170630                      MOV     R2,@ML.REG+160
 6113 022504  012767  100300  170630              MOV     #-77500,ML.REG+166              ;       3995
 6114 022512  142777  000010  170554              BICB    #10,@ML.REG+120                 ;       3996
 6115 022520  000207                              RTS     PC                              ;       3966
 6116
 6117                                   ; Routine Size:  32 words
 6118                                   ; Maximum stack depth per invocation:  3 words
 6123
 6124
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (44)

```
6126 ;ML4
6127 ;
6128
6129 ;          3998  routine RD_D3 (TST_PAT, index, ERR_FLG) : novalue =
6130 ;          3999      begin
6131 ;          4000
6132 ;          4001  !++
6133 ;          4002  ! FUNCTIONAL DESCRIPTION:
6134 ;          4003  !
6135 ;          4004  !       COMPARES THE CONTENTS OF THE
6136 ;          4005  !       DATA DIAG REGISTER 3
6137 ;          4006  !       WITH THE MASKED DATA PATTERN
6138 ;          4007  !       GENERATED BY THE MACRO 'WRT_MASK".
6139 ;          4008  !
6140 ;          4009  !       IF THE COMPARE IS NOT EQUAL THE
6141 ;          4010  !       FORMAL PARAMETER 'ERR_FLG" IS
6142 ;          4011  !       ASSIGNED A ONE TO INDICATE THE
6143 ;          4012  !       ERROR.
6144 ;          4013  !
6145 ;          4014  ! FORMAL PARAMETERS:
6146 ;          4015  !
6147 ;          4016  !       TST_PAT
6148 ;          4017  !       DATA PATTERN TO BE MASKED AND
6149 ;          4018  !       COMPARED AGAINST THE CONTENTS
6150 ;          4019  !       OF THE REGISTER UNDER TEST.
6151 ;          4020  !
6152 ;          4021  !       INDEX
6153 ;          4022  !       USED BY THE MACRO WRT_MASK TO
6154 ;          4023  !       SELECT THE CURRENT REGISTERS ADDRESS,
6155 ;          4024  !       FORCED HI, FORCED LO AND DON'T CARE
6156 ;          4025  !       MASK INFORMATION
6157 ;          4026  !
6158 ;          4027  !       ERR_FLG
6159 ;          4028  !       CONTAINS THE ADDRESS (PASSED BY REF)
6160 ;          4029  !       OF THE CALLERS ERROR FLG TO ENABLE THE
6161 ;          4030  !       CALLER TO EXAMINE THE ERROR STATUS
6162 ;          4031  !       OF THE ROUTINE CALL.
6163 ;          4032  !
6164 ;          4033  ! IMPLICIT INPUTS:
6165 ;          4034  !       WT_DATA
6166 ;          4035  !         GETS LOADED WITH THE GENERATED
6167 ;          4036  !         WRT_MASK DATA PATTERN THUS ALLOWING
6168 ;          4037  !         CALLER TO PRINT FAILING GOOD DATA.
6169 ;          4038  !
6170 ;          4039  !       RD_DATA
6171 ;          4040  !         GETS LOADED WITH DATA READ FROM THE
6172 ;          4041  !         REGISTER THUS ALLOWING CALLER
6173 ;          4042  !         TO PRINT FAILING BAD DATA.
6174 ;          4043  !
6175 ;          4044  ! IMPLICIT OUTPUTS:
6176 ;          4045  !       GLOBAL LOCATION WR_DATA
6177 ;          4046  !       AND RD_DATA LOADED WITH GOOD
6178 ;          4047  !       AND BAD REGISTER DATA
6179 ;          4048  !
6180 ;          4049  !--
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (44)

;          4050
;          4051       .ERR_FLG = ZERO;                          !CLEAR ERROR FLAG
;          4052       MLE2_MASK = %o'000377';                   !SET DATA DIAG MODE
;          4053       DAT_DM = ONE;
;          4054       ML_FUNC = write;                          !LOAD WRITE FUNCTION TO MLCS1
;          4055       DAT_CLK = ONE;                            !DO A DATA CLOCK
;          4056
;          4057       if .REG_INIT_FLG IS_SET                   !SEE IF CALLER IS  REG INIT TEST
;          4058       then                                      !CLEAR  MBUS TO GENERATE INIT DATA
;          4059            begin
;          4060            CLR_MBUS;
;          4061            DAT_DM = ONE;
;          4062            end;
;          4063
;          4064       WT_DATA = WRT_MASK;                       !SAVE THE DATA WRITTEN TO THE REGISTER
;          4065       RD_DATA = .MLE2 or .IGNORE;               !READ AND SAVE THE REGISTER
;          4066
;          4067       if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          4068
;          4069       MLE2_MASK = %o'100300';
;          4070       CLR_MBUS;                                 !CLEAR THE MASS BUS
;          4071       end;
;
;                                  .SBTTL  RD.D3
;022522  004167  161316      RD.D3: JSR     R1,$SAVE2                    ;                    3998
;022526  005076  000010             CLR     @10(SP)                      ; ERR.FLG            4051
;022532  012767  000377  170602     MOV     #377,ML.REG+166              ;                    4052
;022540  152777  000010  170526     BISB    #10,@ML.REG+120              ;                    4053
;022546  142777  000077  170400     BICB    #77,@ML.REG                  ;                    4054
;022554  152777  000061  170372     BISB    #61,@ML.REG
;022562  152777  000020  170504     BISB    #20,@ML.REG+120              ;                    4055
;022570  026727  170342  000001     CMP     REG.INIT.FLG,#1              ;                    4057
;022576  001017                     BNE     1$
;022600  152777  000040  170406     BISB    #40,@ML.REG+40               ;                    4059
;022606  016701  170770             MOV     ML.DUT,R1
;022612  042701  177770             BIC     #177770,R1
;022616  142777  000007  170370     BICB    #7,@ML.REG+40
;022624  150177  170364             BISB    R1,@ML.REG+40
;022630  152777  000010  170436     BISB    #10,@ML.REG+120              ;                    4061
;022636  016600  000012      1$:    MOV     12(SP),R0                    ; INDEX,*            4064
;022642  006300                     ASL     R0
;022644  006300                     ASL     R0
;022646  006300                     ASL     R0
;022650  010001                     MOV     R0,R1
;022652  016100  013156             MOV     ML.REG+2(R1),R0
;022656  056600  000014             BIS     14(SP),R0                    ; TST.PAT,*
```

```
                                                                                                    14-May-1981 13:48:54    TOPS
                                                                                                    14-May-1981 13:05:08    PA:<
                        ;ML4
                        ;
022662  046100  013160          BIC     ML.REG+4(R1),R0
022666  016102  013162          MOV     ML.REG+6(R1),R2
022672  050002                  BIS     R0,R2
022674  010267  170226          MOV     R2,WT.DATA
022700  017702  170430          MOV     @ML.REG+160,R2                  ;                       4065
022704  056102  013162          BIS     ML.REG+6(R1),R2
022710  010267  170214          MOV     R2,RD.DATA
022714  026767  170206  170206  CMP     WT.DATA,RD.DATA                 ;                       4067
022722  001403                  BEQ     2$
022724  012776  000001  000010  MOV     #1,@10(SP)                      ; *,ERR.FLG
022732  012767  100300  170402  2$:     MOV     #-77500,ML.REG+166      ;                       4069
022740  152777  000040  170246          BISB    #40,@ML.REG+40
022746  016702  170630          MOV     ML.DUT,R2
022752  042702  177770          BIC     #177770,R2
022756  142777  000007  170230          BICB    #7,@ML.REG+40
022764  150277  170224          BISB    R2,@ML.REG+40
022770  000207                  RTS     PC                              ;                       3998

                        ; Routine Size:  84 words
                        ; Maximum stack depth per invocation:  3 words
```

```
                                                        14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                        14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (45)

                4072  routine WRT_DS (TST_PAT, index) : novalue =
                4073      begin
                4074
                4075  !++
                4076  ! FUNCTIONAL DESCRIPTION:
                4077  !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
                4078  !       WRITE REGISTER ALGORITHEM
                4079  !
                4080  ! FORMAL PARAMETERS:
                4081  !       TST_PAT
                4082  !       DATA PATTERN TO BE MASKED AND
                4083  !       COMPARED AGAINST THE CONTENTS
                4084  !       OF THE REGISTER UNDER TEST
                4085  !
                4086  !       INDEX
                4087  !       USED BY THE MACRO WRT_MASK TO
                4088  !       SELECT THE CURRENT REGISTERS ADDRESS,
                4089  !       FORCED HI, FORCED LO AND DON'T CARE
                4090  !       MASK INFORMATION.
                4091  !
                4092  !--
                4093
                4094  !
                4095  !  DRIVE STATUS REG IS READ ONLY
                4096       return;
                4097       end;

                                        .SBTTL  WRT.DS
022772  000207                  WRT.DS: RTS     PC                              ;       4072

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words
```

```
6316 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
6317 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (46)
6318
6319 ;          4098  routine RD_DS (TST_PAT, index, ERR_FLG) : novalue =
6320 ;          4099      begin
6321 ;          4100
6322 ;          4101  !++
6323 ;          4102  ! FUNCTIONAL DESCRIPTION:
6324 ;          4103  !
6325 ;          4104  !       COMPARES THE CONTENTS OF THE
6326 ;          4105  !       DRIVE STATUS REGISTER WITH THE
6327 ;          4106  !       MASKED DATA PATTERN
6328 ;          4107  !       GENERATED BY THE MACRO 'WRT_MASK'.
6329 ;          4108  !
6330 ;          4109  !       IF THE COMPARE IS NOT EQUAL THEN
6331 ;          4110  !       THE FORMAL PARAMETER 'ERR_FLG' IS
6332 ;          4111  !       ASSIGNED A ONE TO INDICATE THE
6333 ;          4112  !       ERROR.
6334 ;          4113  !
6335 ;          4114  ! FORMAL PARAMETERS:
6336 ;          4115  !
6337 ;          4116  !       TST_PAT
6338 ;          4117  !       DATA PATTERN TO BE MASKED AND
6339 ;          4118  !       COMPARED AGAINST THE CONTENTS
6340 ;          4119  !       OF THE REGISTER UNDER TEST.
6341 ;          4120  !
6342 ;          4121  !       INDEX
6343 ;          4122  !       USED BY THE MACRO WRT_MASK TO
6344 ;          4123  !       SELECT THE CURRENT REGISTERS ADDRESS,
6345 ;          4124  !       FORCED HI, FORCED LO AND DON'T CARE
6346 ;          4125  !       MASK INFORMATION.
6347 ;          4126  !
6348 ;          4127  !       ERR_FLG
6349 ;          4128  !       CONTAINS THE ADDRESS (PASSED BY REF)
6350 ;          4129  !       OF THE CALLERS ERROR FLG TO ENABLE THE
6351 ;          4130  !       CALLER TO EXAMINE THE ERROR STATUS
6352 ;          4131  !       OF THE ROUTINE CALL.
6353 ;          4132  !
6354 ;          4133  ! IMPLICIT INPUTS:
6355 ;          4134  !       WT_DATA
6356 ;          4135  !         GETS LOADED WITH THE GENERATED
6357 ;          4136  !         WRT_MASK DATA PATTERN THUS ALLOWING
6358 ;          4137  !         CALLER TO PRINT FAILING GOOD DATA.
6359 ;          4138  !
6360 ;          4139  !       RD_DATA
6361 ;          4140  !         GETS LOADED WITH DATA READ FROM THE
6362 ;          4141  !         REGISTER THUS ALLOWING CALLER
6363 ;          4142  !         TO PRINT FAILING BAD DATA.
6364 ;          4143  !
6365 ;          4144  ! IMPLICIT OUTPUTS:
6366 ;          4145  !       GLOBAL LOCATION WR_DATA
6367 ;          4146  !       AND RD_DATA LOADED WITH GOOD
6368 ;          4147  !       AND BAD REGISTER DATA
6369 ;          4148  !
6370 ;          4149  !--
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (46)

;          4150
;          4151       .ERR_FLG = ZERO;                          !CLEAR THE ERROR FLAG
;          4152       WT_DATA = WRT_MASK;                       !SAVE THE DATA WRITTEN TO THE REGISTER
;          4153       RD_DATA = .MLDS or .IGNORE;               !READ AND SAVE THE REGISTER
;          4154
;          4155       if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          4156
;          4157                                                 !SET ERROR FLAG IF NEQ
;          4158       end;


                                    .SBTTL  RD.DS
022774  004167  161044         RD.DS: JSR     R1,$SAVE2                    ;                          4098
023000  005076  000010                CLR     @10(SP)                      ; ERR.FLG                  4151
023004  016600  000012                MOV     12(SP),R0                    ; INDEX,*                  4152
023010  006300                        ASL     R0
023012  006300                        ASL     R0
023014  006300                        ASL     R0
023016  010001                        MOV     R0,R1
023020  016100  013156                MOV     ML.REG+2(R1),R0
023024  056600  000014                BIS     14(SP),R0                    ; TST.PAT,*
023030  046100  013160                BIC     ML.REG+4(R1),R0
023034  016102  013162                MOV     ML.REG+6(R1),R2
023040  050002                        BIS     R0,R2
023042  010267  170060                MOV     R2,WT.DATA
023046  017702  170152                MOV     @ML.REG+50,R2                ;                          4153
023052  056102  013162                BIS     ML.REG+6(R1),R2
023056  010267  170046                MOV     R2,RD.DATA
023062  026767  170040  170040        CMP     WT.DATA,RD.DATA              ;                          4155
023070  001403                        BEQ     1$
023072  012776  000001  000010        MOV     #1,@10(SP)                   ; *,ERR.FLG
023100  000207                1$:     RTS     PC                           ;                          4098

                        ; Routine Size:  35 words
                        ; Maximum stack depth per invocation:  3 words
```

```
6422 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
6423 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (47)
6424
6425 ;          4159  routine WRT_REG (TST_PAT, REG_SEL, index) : novalue =
6426 ;          4160      begin
6427 ;          4161
6428 ;          4162  !++
6429 ;          4163  ! FUNCTIONAL DESCRIPTION:
6430 ;          4164  !       A ROUTINE TO SELECTIVELY
6431 ;          4165  !       CALLED ROUTINES WHICH
6432 ;          4166  !       WRITE TO INDIVIDUAL ML11
6433 ;          4167  !       REGISTERS
6434 ;          4168  !
6435 ;          4169  ! FORMAL PARAMETERS:
6436 ;          4170  !       REG_SEL
6437 ;          4171  !       CASE SELECT EXPRESSION TO
6438 ;          4172  !       SELECT THE WRITE REGISTER
6439 ;          4173  !       ROUTINE TO CALLED
6440 ;          4174  !
6441 ;          4175  !       TST_PAT
6442 ;          4176  !       DATA PATTERN WHICH THE SELECTED
6443 ;          4177  !       REGISTER WILL BE TESTED AGAINST
6444 ;          4178  !
6445 ;          4179  !       INDEX
6446 ;          4180  !       LOADED WITH THE ML_REG INDEX
6447 ;          4181  !       SELECT NUMBER OF THE REGISTER
6448 ;          4182  !       BEING TESTED
6449 ;          4183  !
6450 ;          4184  ! SIDE EFFECTS:
6451 ;          4185  !       WHEN A WRITE REGISTER ROUTINE IS CALLED
6452 ;          4186  !       THE VARIABLE 'INDEX' FROM THE CALLING
6453 ;          4187  !       TEST IS LOADED WITH THE REGISTERS
6454 ;          4188  !       ML_REG INDEX NUMBER.
6455 ;          4189  !
6456 ;          4190  !       THIS ENABLES THE CALLING TEST TO FIND
6457 ;          4191  !       THE FAILING REGISTER ADDRESS.
6458 ;          4192  !
6459 ;          4193  !--
6460 ;          4194
6461 ;          4195      case .REG_SEL from 0 to 13 of                !SELECT THE WRITE REGISTER ROUTINE CALL
6462 ;          4196          set
6463 ;          4197
6464 ;          4198          [0] :
6465 ;          4199              WRT_CS1 (.TST_PAT, .index = 0);      !CALL ROUTINE TO LOAD MLCS1
6466 ;          4200
6467 ;          4201          [1] :
6468 ;          4202              WRT_ER (.TST_PAT, .index = 6);       !CALL ROUTINE TO LOAD MLER
6469 ;          4203
6470 ;          4204          [2] :
6471 ;          4205              WRT_DA (.TST_PAT, .index = 3);       !CALL ROUTINE TO LOAD MLDA
6472 ;          4206
6473 ;          4207          [3] :
6474 ;          4208              WRT_MR (.TST_PAT, .index = 10);      !CALL ROUTINE TO LOAD MLMR
6475 ;          4209
6476 ;          4210          [4] :
```

```
6478 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
6479 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (47)
6480
6481 ;          4211          WRT_E1 (.TST_PAT, .index = 13);     !CALL ROUTINE TO LOAD MLE1
6482 ;          4212
6483 ;          4213      [5] :
6484 ;          4214          WRT_E2 (.TST_PAT, .index = 14);     !CALL ROUTINE TO LOAD MLE2
6485 ;          4215
6486 ;          4216      [6] :
6487 ;          4217          WRT_PA (.TST_PAT, .index = 8);      !CALL ROUTINE TO LOAD MLPA
6488 ;          4218
6489 ;          4219      [7] :
6490 ;          4220          WRT_PD (.TST_PAT, .index = 19);     !CALL ROUTINE TO LOAD MLPD
6491 ;          4221
6492 ;          4222      [8] :
6493 ;          4223          WRT_EE (.TST_PAT, .index = 17);     !CALL ROUTINE TO LOAD MLEE
6494 ;          4224
6495 ;          4225      [9] :
6496 ;          4226          WRT_EL (.TST_PAT, .index = 18);     !CALL ROUTINE TO LOAD MLEL
6497 ;          4227
6498 ;          4228      [10] :
6499 ;          4229          WRT_DS (.TST_PAT, .index = 5);      !CALL ROUTINE TO LOAD MLDS
6500 ;          4230
6501 ;          4231      [11] :
6502 ;          4232          WRT_D1 (.TST_PAT, .index = 15);     !CALL ROUTINE TO LOAD MLD1
6503 ;          4233
6504 ;          4234      [12] :
6505 ;          4235          WRT_D2 (.TST_PAT, .index = 16);     !CALL ROUTINE TO LOAD MLD2
6506 ;          4236
6507 ;          4237      [13] :
6508 ;          4238          WRT_D3 (.TST_PAT, .index = 14);     !CALL ROUTINE TO LOAD MLE2
6509 ;          4239      tes;
6510 ;          4240
6511 ;          4241  end;
6515
6516                                    .SBTTL  WRT.REG
6520 023102  004167  160736  WRT.REG:  JSR     R1,$SAVE2          ;                              4159
6521 023106  016600  000010            MOV     10(SP),R0          ; INDEX,*                      4199
6522 023112  016601  000014            MOV     14(SP),R1          ; TST.PAT,*
6523 023116  016602  000012            MOV     12(SP),R2          ; REG.SEL,*                    4195
6524 023122  006302                    ASL     R2
6525 023124  066207  023130            ADD     1$(R2),PC
6526 023130  000034            1$:     .WORD   2$-1$
6527 023132  000050                    .WORD   3$-1$
6528 023134  000066                    .WORD   4$-1$
6529 023136  000104                    .WORD   5$-1$
6530 023140  000122                    .WORD   6$-1$
6531 023142  000140                    .WORD   7$-1$
6532 023144  000156                    .WORD   8$-1$
```

```
                                                                                14-May-1981 13:48:54    TOPS
                                                                                14-May-1981 13:05:08    PA:<
 6534                           ;ML4
 6535                           ;
 6536
 6537 023146  000174                    .WORD   9$-1$
 6538 023150  000212                    .WORD   10$-1$
 6539 023152  000230                    .WORD   11$-1$
 6540 023154  000246                    .WORD   12$-1$
 6541 023156  000264                    .WORD   13$-1$
 6542 023160  000302                    .WORD   14$-1$
 6543 023162  000320                    .WORD   15$-1$
 6544 023164  010146            2$:     MOV     R1,-(SP)                ;                               4199
 6545 023166  005010                    CLR     (R0)
 6546 023170  005046                    CLR     -(SP)
 6547 023172  004767  174272            JSR     PC,WRT.CS1
 6548 023176  000532                    BR      16$                     ;                               4195
 6549 023200  010146            3$:     MOV     R1,-(SP)                ;                               4202
 6550 023202  012710  000006            MOV     #6,(R0)
 6551 023206  011046                    MOV     (R0),-(SP)
 6552 023210  004767  174432            JSR     PC,WRT.ER
 6553 023214  000523                    BR      16$                     ;                               4195
 6554 023216  010146            4$:     MOV     R1,-(SP)                ;                               4205
 6555 023220  012710  000003            MOV     #3,(R0)
 6556 023224  011046                    MOV     (R0),-(SP)
 6557 023226  004767  174572            JSR     PC,WRT.DA
 6558 023232  000514                    BR      16$                     ;                               4195
 6559 023234  010146            5$:     MOV     R1,-(SP)                ;                               4208
 6560 023236  012710  000012            MOV     #12,(R0)
 6561 023242  011046                    MOV     (R0),-(SP)
 6562 023244  004767  174732            JSR     PC,WRT.MR
 6563 023250  000505                    BR      16$                     ;                               4195
 6564 023252  010146            6$:     MOV     R1,-(SP)                ;                               4211
 6565 023254  012710  000015            MOV     #15,(R0)
 6566 023260  011046                    MOV     (R0),-(SP)
 6567 023262  004767  175300            JSR     PC,WRT.E1
 6568 023266  000476                    BR      16$                     ;                               4195
 6569 023270  010146            7$:     MOV     R1,-(SP)                ;                               4214
 6570 023272  012710  000016            MOV     #16,(R0)
 6571 023276  011046                    MOV     (R0),-(SP)
 6572 023300  004767  175470            JSR     PC,WRT.E2
 6573 023304  000467                    BR      16$                     ;                               4195
 6574 023306  010146            8$:     MOV     R1,-(SP)                ;                               4217
 6575 023310  012710  000010            MOV     #10,(R0)
 6576 023314  011046                    MOV     (R0),-(SP)
 6577 023316  004767  175036            JSR     PC,WRT.PA
 6578 023322  000460                    BR      16$                     ;                               4195
 6579 023324  010146            9$:     MOV     R1,-(SP)                ;                               4220
 6580 023326  012710  000023            MOV     #23,(R0)
 6581 023332  011046                    MOV     (R0),-(SP)
 6582 023334  004767  175666            JSR     PC,WRT.PD
 6583 023340  000451                    BR      16$                     ;                               4195
 6584 023342  010146            10$:    MOV     R1,-(SP)                ;                               4223
 6585 023344  012710  000021            MOV     #21,(R0)
 6586 023350  011046                    MOV     (R0),-(SP)
 6587 023352  004767  176156            JSR     PC,WRT.EE
 6588 023356  000442                    BR      16$                     ;                               4195
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                        11$:    MOV     R1,-(SP)                ;                                       4226
023362  012710  000022                        MOV     #22,(R0)
023366  011046                                MOV     (R0),-(SP)
023370  004767  176076                        JSR     PC,WRT.EL
023374  000433                              BR      16$                         ;                                       4195
023376  010146                        12$:    MOV     R1,-(SP)                ;                                       4229
023400  012710  000005                        MOV     #5,(R0)
023404  011046                                MOV     (R0),-(SP)
023406  004767  177360                        JSR     PC,WRT.DS
023412  000424                              BR      16$                         ;                                       4195
023414  010146                        13$:    MOV     R1,-(SP)                ;                                       4232
023416  012710  000017                        MOV     #17,(R0)
023422  011046                                MOV     (R0),-(SP)
023424  004767  176146                        JSR     PC,WRT.D1
023430  000415                              BR      16$                         ;                                       4195
023432  010146                        14$:    MOV     R1,-(SP)                ;                                       4235
023434  012710  000020                        MOV     #20,(R0)
023440  011046                                MOV     (R0),-(SP)
023442  004767  176442                        JSR     PC,WRT.D2
023446  000406                              BR      16$                         ;                                       4195
023450  010146                        15$:    MOV     R1,-(SP)                ;                                       4238
023452  012710  000016                        MOV     #16,(R0)
023456  011046                                MOV     (R0),-(SP)
023460  004767  176736                        JSR     PC,WRT.D3
023464  022626                        16$:    CMP     (SP)+,(SP)+             ;                                       4160
023466  000207                              RTS     PC                      ;                                       4159

                                        ; Routine Size:  123 words
                                        ; Maximum stack depth per invocation:  5 words
```

```
6629 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
6630 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (48)
6631 ;
6632 ;          4242  routine RD_REG (TST_PAT, REG_SEL, ERR_FLG) : novalue =
6633 ;          4243      begin
6634 ;          4244
6635 ;          4245  !++
6636 ;          4246  ! FUNCTIONAL DESCRIPTION:
6637 ;          4247  !       A ROUTINE TO SELECTIVELY
6638 ;          4248  !       CALLED ROUTINES WHICH
6639 ;          4249  !       READ TO INDIVIDUAL ML11
6640 ;          4250  !       REGISTERS.
6641 ;          4251  !
6642 ;          4252  ! FORMAL PARAMETERS:
6643 ;          4253  !       ERR_FLG
6644 ;          4254  !       CONTAINS THE ADDRESS (PASSED BY REF)
6645 ;          4255  !       OF THE CALLERS ERROR FLG TO ENABLE THE
6646 ;          4256  !       CALLER TO EXAMINE THE ERROR STATUS
6647 ;          4257  !       OF THE ROUTINE CALL.
6648 ;          4258  !
6649 ;          4259  !       REG_SEL
6650 ;          4260  !       CASE SELECT EXPRESSION TO
6651 ;          4261  !       SELECT THE WRITE REGISTER
6652 ;          4262  !       ROUTINE TO CALLED
6653 ;          4263  !
6654 ;          4264  !       TST_PAT
6655 ;          4265  !       DATA PATTERN WHICH THE SELECTED
6656 ;          4266  !       REGISTER WILL BE TESTED AGAINST
6657 ;          4267  !
6658 ;          4268  !--
6659 ;          4269
6660 ;          4270      case .REG_SEL from 0 to 13 of                !SELECT THE READ REGISTER ROUTINE CALL
6661 ;          4271          set
6662 ;          4272
6663 ;          4273          [0] :
6664 ;          4274              RD_CS1 (.TST_PAT, 0, .ERR_FLG);      !CALL ROOUTINE TO READ MLCS1
6665 ;          4275
6666 ;          4276          [1] :
6667 ;          4277              RD_ER (.TST_PAT, 6, .ERR_FLG);       !CALL ROUTINE TO READ MLER
6668 ;          4278
6669 ;          4279          [2] :
6670 ;          4280              RD_DA (.TST_PAT, 3, .ERR_FLG);       !CALL ROUTINE TO READ MLDA
6671 ;          4281
6672 ;          4282          [3] :
6673 ;          4283              RD_MR (.TST_PAT, 10, .ERR_FLG);      !CALL ROUTINE TO READ MLMR
6674 ;          4284
6675 ;          4285          [4] :
6676 ;          4286              RD_E1 (.TST_PAT, 13, .ERR_FLG);      !CALL ROUTINE TO READ MLE1
6677 ;          4287
6678 ;          4288          [5] :
6679 ;          4289              RD_E2 (.TST_PAT, 14, .ERR_FLG);      !CALL ROUTINE TO READ MLE2
6680 ;          4290
6681 ;          4291          [6] :
6682 ;          4292              RD_PA (.TST_PAT, 8, .ERR_FLG);       !CALL ROUTINE TO READ MLPA
6683 ;          4293
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (48)

6685 :ML4
6686 :
6687
6688 ;          4294            [7] :
6689 ;          4295                RD_PD (.TST_PAT, 19, .ERR_FLG);     !CALL ROUTINE TO READ MLPD
6690 ;          4296
6691 ;          4297            [8] :
6692 ;          4298                RD_EE (.TST_PAT, 17, .ERR_FLG);     !CALL ROUTINE TO READ MLEE
6693 ;          4299
6694 ;          4300            [9] :
6695 ;          4301                RD_EL (.TST_PAT, 18, .ERR_FLG);     !CALL ROUTINE TO READ MLEL
6696 ;          4302
6697 ;          4303            [10] :
6698 ;          4304                RD_DS (.TST_PAT, 5, .ERR_FLG);      !CALL ROUTINE TO READ MLDS
6699 ;          4305
6700 ;          4306            [11] :
6701 ;          4307                RD_D1 (.TST_PAT, 15, .ERR_FLG);     !CALL ROUTINE TO READ MLD1
6702 ;          4308
6703 ;          4309            [12] :
6704 ;          4310                RD_D2 (.TST_PAT, 16, .ERR_FLG);     !CALL ROUTINE TO READ MLD2
6705 ;          4311
6706 ;          4312            [13] :
6707 ;          4313                RD_D3 (.TST_PAT, 14, .ERR_FLG);     !CALL ROUTINE TO READ MLE2
6708 ;          4314            tes;
6709 ;          4315
6710 ;          4316        end;
6714
6715                                        .SBTTL  RD.REG
6719 023470  004167  160350        RD.REG: JSR     R1,$SAVE2                   ;                                   4242
6720 023474  016600  000010                MOV     10(SP),R0                   ; ERR.FLG,*                         4274
6721 023500  016601  000014                MOV     14(SP),R1                   ; TST.PAT,*
6722 023504  016602  000012                MOV     12(SP),R2                   ; REG.SEL,*                         4270
6723 023510  006302                        ASL     R2
6724 023512  066207  023516                ADD     1$(R2),PC
6725 023516  000034                1$:     .WORD   2$-1$
6726 023520  000050                        .WORD   3$-1$
6727 023522  000066                        .WORD   4$-1$
6728 023524  000104                        .WORD   5$-1$
6729 023526  000122                        .WORD   6$-1$
6730 023530  000140                        .WORD   7$-1$
6731 023532  000156                        .WORD   8$-1$
6732 023534  000174                        .WORD   9$-1$
6733 023536  000212                        .WORD   10$-1$
6734 023540  000230                        .WORD   11$-1$
6735 023542  000246                        .WORD   12$-1$
6736 023544  000264                        .WORD   13$-1$
6737 023546  000302                        .WORD   14$-1$
6738 023550  000320                        .WORD   15$-1$
6739 023552  010146                2$:     MOV     R1,-(SP)                    ;                                   4274
```

```
6741                                    ;ML4                                                    14-May-1981 13:48:54    TOPS
6742                                    ;                                                       14-May-1981 13:05:08    PA:<
6743
6744 023554  005046                             CLR     -(SP)
6745 023556  010046                             MOV     R0,-(SP)
6746 023560  004767  173754                     JSR     PC,RD.CS1
6747 023564  000532                             BR      16$                                                             4270
6748 023566  010146                    3$:      MOV     R1,-(SP)        ;                                               4277
6749 023570  012746  000006                     MOV     #6,-(SP)
6750 023574  010046                             MOV     R0,-(SP)
6751 023576  004767  174114                     JSR     PC,RD.ER
6752 023602  000523                             BR      16$                                                             4270
6753 023604  010146                    4$:      MOV     R1,-(SP)        ;                                               4280
6754 023606  012746  000003                     MOV     #3,-(SP)
6755 023612  010046                             MOV     R0,-(SP)
6756 023614  004767  174254                     JSR     PC,RD.DA
6757 023620  000514                             BR      16$                                                             4270
6758 023622  010146                    5$:      MOV     R1,-(SP)        ;                                               4283
6759 023624  012746  000012                     MOV     #12,-(SP)
6760 023630  010046                             MOV     R0,-(SP)
6761 023632  004767  174414                     JSR     PC,RD.MR
6762 023636  000505                             BR      16$                                                             4270
6763 023640  010146                    6$:      MOV     R1,-(SP)        ;                                               4286
6764 023642  012746  000015                     MOV     #15,-(SP)
6765 023646  010046                             MOV     R0,-(SP)
6766 023650  004767  174776                     JSR     PC,RD.E1
6767 023654  000476                             BR      16$                                                             4270
6768 023656  010146                    7$:      MOV     R1,-(SP)        ;                                               4289
6769 023660  012746  000016                     MOV     #16,-(SP)
6770 023664  010046                             MOV     R0,-(SP)
6771 023666  004767  175200                     JSR     PC,RD.E2
6772 023672  000467                             BR      16$                                                             4270
6773 023674  010146                    8$:      MOV     R1,-(SP)        ;                                               4292
6774 023676  012746  000010                     MOV     #10,-(SP)
6775 023702  010046                             MOV     R0,-(SP)
6776 023704  004767  174534                     JSR     PC,RD.PA
6777 023710  000460                             BR      16$                                                             4270
6778 023712  010146                    9$:      MOV     R1,-(SP)        ;                                               4295
6779 023714  012746  000023                     MOV     #23,-(SP)
6780 023720  010046                             MOV     R0,-(SP)
6781 023722  004767  175406                     JSR     PC,RD.PD
6782 023726  000451                             BR      16$                                                             4270
6783 023730  010146                    10$:     MOV     R1,-(SP)        ;                                               4298
6784 023732  012746  000021                     MOV     #21,-(SP)
6785 023736  010046                             MOV     R0,-(SP)
6786 023740  004767  175572                     JSR     PC,RD.EE
6787 023744  000442                             BR      16$                                                             4270
6788 023746  010146                    11$:     MOV     R1,-(SP)        ;                                               4301
6789 023750  012746  000022                     MOV     #22,-(SP)
6790 023754  010046                             MOV     R0,-(SP)
6791 023756  004767  175512                     JSR     PC,RD.EL
6792 023762  000433                             BR      16$                                                             4270
6793 023764  010146                    12$:     MOV     R1,-(SP)        ;                                               4304
6794 023766  012746  000005                     MOV     #5,-(SP)
6795 023772  010046                             MOV     R0,-(SP)
```

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                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                
023774  004767  176774                JSR     PC,RD.DS
024000  000424                      BR      16$
024002  010146          13$:        MOV     R1,-(SP)                        ;       ;       4270
024004  012746  000017                MOV     #17,-(SP)                       ;       ;       4307
024010  010046                      MOV     R0,-(SP)
024012  004767  175644                JSR     PC,RD.D1
024016  000415                      BR      16$                             ;       ;       4270
024020  010146          14$:        MOV     R1,-(SP)                        ;       ;       4310
024022  012746  000020                MOV     #20,-(SP)
024026  010046                      MOV     R0,-(SP)
024030  004767  176140                JSR     PC,RD.D2
024034  000406                      BR      16$                             ;       ;       4270
024036  010146          15$:        MOV     R1,-(SP)                        ;       ;       4313
024040  012746  000016                MOV     #16,-(SP)
024044  010046                      MOV     R0,-(SP)
024046  004767  176450                JSR     PC,RD.D3
024052  062706  000006          16$:  ADD     #6,SP                           ;       ;       4243
024056  000207                      RTS     PC                              ;       ;       4242
                                
                                ; Routine Size:  124 words
                                ; Maximum stack depth per invocation:  6 words
                                
                                
;       4317  !<BLF/PAGE>
```

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 6829 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 6830 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (49)
 6831
 6832 ;          4318  BGNMSG (DUMPER);
 6836
 6837                                        .SBTTL  DUMPER
 6841 024060  004767  000004          DUMPER::JSR     PC,M$DUMPER                    ;                          4318
 6842 024064  104423                         TRAP    23
 6843 024066  000207                         RTS     PC
 6844
 6845                                ; Routine Size:  4 words
 6846                                ; Maximum stack depth per invocation:  0 words
 6851
 6852
 6853 ;          4319
 6854 ;          4320  !++
 6855 ;          4321  !       FUNCTIONAL DESCRIPTION
 6856 ;          4322  !               UPON COMPLETION OF ERROR MESSAGES
 6857 ;          4323  !               DUMP OUT ALL PERTINENT DRIVE AND
 6858 ;          4324  !               RH REGISTERS
 6859 ;          4325  !--
 6860 ;          4326
 6861 ;          4327  PRINTB (ONE_FMT, PHR_14);                  !PRINT REGISTER DUMP MESSAGE
 6862 ;          4328  PRINTB (FMT_23);                           !PRINT DUMPER COLUMN HEADINGS
 6863 ;          4329  PRINTB (FMT_24, REG_1, MLCS1, .MLCS1);     !PRINT OUT THE RH & ML11 REGISTER CONTENTS
 6864 ;          4330  PRINTB (FMT_24, REG_18, MLWC, .MLWC);
 6865 ;          4331  PRINTB (FMT_24, REG_19, MLBA, .MLBA);
 6866 ;          4332  PRINTB (FMT_24, REG_6, MLDA, .MLDA);
 6867 ;          4333  PRINTB (FMT_24, REG_17, MLCS2, .MLCS2);
 6868 ;          4334  PRINTB (FMT_24, REG_2, MLDS, .MLDS);
 6869 ;          4335  PRINTB (FMT_24, REG_3, MLER, .MLER);
 6870 ;          4336  PRINTB (FMT_24, REG_5, MLAS, .MLAS);
 6871 ;          4337  PRINTB (FMT_24, REG_4, MLMR, .MLMR);
 6872 ;          4338  PRINTB (FMT_24, REG_7, MLDT, .MLDT);
 6873 ;          4339  PRINTB (FMT_24, REG_9, MLSN, .MLSN);
 6874 ;          4340  PRINTB (FMT_24, REG_14, MLEE, .MLEE);
 6875 ;          4341  PRINTB (FMT_24, REG_15, MLEL, .MLEL);
 6876 ;          4342
 6877 ;          4343  if .LST_DUT_REG eql 21                    !SEE IF THIS IS A RH70
 6878 ;          4344  then                                      !IF YES THEN PRINT RH70 REGISTERS
 6879 ;          4345      begin
 6880 ;          4346      PRINTB (FMT_24, REG_20, MLBAE, .MLBAE);
 6881 ;          4347      PRINTB (FMT_24, REG_21, MLCS3, .MLCS3);
 6882 ;          4348      end;
 6883 ;          4349
```

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6885 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
6886 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (49)
6887
6888 ;          4350  ENDMSG;
6892
6893                                    .SBTTL  M$DUMPER
6897 024070                        M$DUMPER:
6898 024070  012746  007662                MOV     #PHR.14,-(SP)                ;                          4327
6899 024074  012746  006016                MOV     #ONE.FMT,-(SP)
6900 024100  012746  000002                MOV     #2,-(SP)
6901 024104  010600                        MOV     SP,R0                        ; SP,*
6902 024106  104414                        TRAP    14
6903 024110  012716  005652                MOV     #FMT.23,(SP)                 ;                          4328
6904 024114  012746  000001                MOV     #1,-(SP)
6905 024120  010600                        MOV     SP,R0                        ; SP,*
6906 024122  104414                        TRAP    14
6907 024124  017716  167024                MOV     @ML.REG,(SP)                 ;                          4329
6908 024130  016746  167020                MOV     ML.REG,-(SP)
6909 024134  012746  010256                MOV     #REG.1,-(SP)
6910 024140  012746  005722                MOV     #FMT.24,-(SP)
6911 024144  012746  000004                MOV     #4,-(SP)
6912 024150  010600                        MOV     SP,R0                        ; SP,*
6913 024152  104414                        TRAP    14
6914 024154  017716  167004                MOV     @ML.REG+10,(SP)              ;                          4330
6915 024160  016746  167000                MOV     ML.REG+10,-(SP)
6916 024164  012746  010430                MOV     #REG.18,-(SP)
6917 024170  012746  005722                MOV     #FMT.24,-(SP)
6918 024174  012746  000004                MOV     #4,-(SP)
6919 024200  010600                        MOV     SP,R0                        ; SP,*
6920 024202  104414                        TRAP    14
6921 024204  017716  166764                MOV     @ML.REG+20,(SP)              ;                          4331
6922 024210  016746  166760                MOV     ML.REG+20,-(SP)
6923 024214  012746  010436                MOV     #REG.19,-(SP)
6924 024220  012746  005722                MOV     #FMT.24,-(SP)
6925 024224  012746  000004                MOV     #4,-(SP)
6926 024230  010600                        MOV     SP,R0                        ; SP,*
6927 024232  104414                        TRAP    14
6928 024234  017716  166744                MOV     @ML.REG+30,(SP)              ;                          4332
6929 024240  016746  166740                MOV     ML.REG+30,-(SP)
6930 024244  012746  010316                MOV     #REG.6,-(SP)
6931 024250  012746  005722                MOV     #FMT.24,-(SP)
6932 024254  012746  000004                MOV     #4,-(SP)
6933 024260  010600                        MOV     SP,R0                        ; SP,*
6934 024262  104414                        TRAP    14
6935 024264  017716  166724                MOV     @ML.REG+40,(SP)              ;                          4333
6936 024270  016746  166720                MOV     ML.REG+40,-(SP)
6937 024274  012746  010420                MOV     #REG.17,-(SP)
6938 024300  012746  005722                MOV     #FMT.24,-(SP)
6939 024304  012746  000004                MOV     #4,-(SP)
```

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                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                MOV     @ML.REG+50,(SP)         ;                                       4334
                                                MOV     ML.REG+50,-(SP)
                                                MOV     #REG.2,-(SP)
                                                MOV     #FMT.24,-(SP)
                                                MOV     #4,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                MOV     @ML.REG+60,(SP)         ;                                       4335
                                                MOV     ML.REG+60,-(SP)
                                                MOV     #REG.3,-(SP)
                                                MOV     #FMT.24,-(SP)
                                                MOV     #4,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                MOV     @ML.REG+70,(SP)         ;                                       4336
                                                MOV     ML.REG+70,-(SP)
                                                MOV     #REG.5,-(SP)
                                                MOV     #FMT.24,-(SP)
                                                MOV     #4,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                MOV     @ML.REG+120,(SP)        ;                                       4337
                                                MOV     ML.REG+120,-(SP)
                                                MOV     #REG.4,-(SP)
                                                MOV     #FMT.24,-(SP)
                                                MOV     #4,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                MOV     @ML.REG+130,(SP)        ;                                       4338
                                                MOV     ML.REG+130,-(SP)
                                                MOV     #REG.7,-(SP)
                                                MOV     #FMT.24,-(SP)
                                                MOV     #4,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                MOV     @ML.REG+140,(SP)        ;                                       4339
                                                MOV     ML.REG+140,-(SP)
                                                MOV     #REG.9,-(SP)
                                                MOV     #FMT.24,-(SP)
                                                MOV     #4,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                MOV     @ML.REG+210,(SP)        ;                                       4340
                                                MOV     ML.REG+210,-(SP)
                                                MOV     #REG.14,-(SP)
                                                MOV     #FMT.24,-(SP)
                                                MOV     #4,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                ADD     #146,SP
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                
024570  017716  166600                MOV     @ML.REG+220,(SP)                ;                               4341
024574  016746  166574                MOV     ML.REG+220,-(SP)
024600  012746  010404                MOV     #REG.15,-(SP)
024604  012746  005722                MOV     #FMT.24,-(SP)
024610  012746  000004                MOV     #4,-(SP)
024614  010600                        MOV     SP,R0                           ; SP,*
024616  104414                        TRAP    14
024620  026727  166310  000025        CMP     LST.DUT.REG,#25                 ;               4343
024626  001032                        BNE     1$
024630  017746  166560                MOV     @ML.REG+240,-(SP)               ;               4346
024634  016746  166554                MOV     ML.REG+240,-(SP)
024640  012746  010444                MOV     #REG.20,-(SP)
024644  012746  005722                MOV     #FMT.24,-(SP)
024650  012746  000004                MOV     #4,-(SP)
024654  010600                        MOV     SP,R0                           ; SP,*
024656  104414                        TRAP    14
024660  017716  166540                MOV     @ML.REG+250,(SP)                ;               4347
024664  016746  166534                MOV     ML.REG+250,-(SP)
024670  012746  010454                MOV     #REG.21,-(SP)
024674  012746  005722                MOV     #FMT.24,-(SP)
024700  012746  000004                MOV     #4,-(SP)
024704  010600                        MOV     SP,R0                           ; SP,*
024706  104414                        TRAP    14
024710  062706  000022                ADD     #22,SP                          ;               4345
024714  062706  000012        1$:     ADD     #12,SP                          ;               4318
024720  000207                        RTS     PC
                                
                                ; Routine Size:  205 words
                                ; Maximum stack depth per invocation:  52 words
                                
                                
;               4351    !<BLF/PAGE>
```

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7037 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
7038 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (50)
7039
7040 ;          4352  ;
7041 ;          4353  BGNINIT;
7042 ;          4354  !       INITIALIZATION CODE IS EXECUTED AT THE BEGINNING OF EACH
7043 ;          4355  !       PASS, WHEN POWER DOWN/POWER UP HAS OCCURRED, OR WHEN THE
7044 ;          4356  !       OPERATOR HAS ISSUED A START, RESTART OR CONTINUE COMMAND.
7045 ;          4357  !         DURING INITIALIZATION, THE 'GPHARD' MACRO IS USED TO GET
7046 ;          4358  !       P-TABLE INFORMATION FOR THE LOGICAL UNIT UNDER TEST. THE
7047 ;          4359  !       NUMBER OF UNITS  AVAILABLE FOR TESTING IS CONTAINED IN A
7048 ;          4360  !       HEADER LOCATION ('L$UNIT').
7049 ;          4361
7050 ;          4362  local
7051 ;          4363      OFFSET;
7052 ;          4364
7053 ;          4365  external
7054 ;          4366      L$UNIT;
7055 ;          4367
7056 ;          4368  if not READEF (EF_CONTINUE)                    !SKIP INIT CODE IF CONTINUE
7057 ;          4369  then
7058 ;          4370      begin                                      !START GPHARDS AT LUN 0 AND LOAD 'ML_REG'
7059 ;          4371
7060 ;          4372      if READEF (EF_START)                       !SEE IF THIS IS THE VERY FIRST PASS
7061 ;          4373      then
7062 ;          4374          begin                                  !THIS IS CATEGORY 1 CODE
7063 ;          4375          ML_LUN = -1;
7064 ;          4376
7065 ;          4377          do
7066 ;          4378              begin
7067 ;          4379              ML_LUN = .ML_LUN + 1;              !INCREMENT LOGICAL UNIT NUMBER
7068 ;          4380
7069 ;          4381              if .ML_LUN geq .L$UNIT then DOCLN; !START OVER IF ALL UNITS HAVE BEEN TESTED
7070 ;          4382
7071 ;          4383              end
7072 ;          4384          until (GPHARD (.ML_LUN, PTBL_PTR)) neq 0;       !REPEAT UNTIL A ZERO IS NOT RETURNED
7073 ;          4385
7074 ;          4386          RH_ADD = .((.PTBL_PTR) + 0);           !GET BASE RH ADDRESS FOR THIS UNIT
7075 ;          4387          RH_TYP = .((.PTBL_PTR) + 2);           !GET RH TYPE FOR THIS UNIT
7076 ;          4388          RH_VEC = .((.PTBL_PTR) + 4);           !GET RH VECTOR FOR THIS UNIT
7077 ;          4389          OFFSET = 0;                            !INIT OFF SET COUNT
7078 ;          4390
7079 ;          4391          incr COUNT from 0 to 21 do             !LOAD THE REGISTER ADDRESS FOR THIS UNIT INTO ML_REG
7080 ;          4392              begin
7081 ;          4393              ML_REG [.COUNT, REGISTER_ADD] = .RH_ADD + .OFFSET;
7082 ;          4394              OFFSET = .OFFSET + 2;
7083 ;          4395              end;
7084 ;          4396
7085 ;          4397          end
7086 ;          4398      else                                       !IS THIS A NEW PASS
7087 ;          4399          begin
7088 ;          4400
7089 ;          4401          if READEF (EF_NEW) then ML_LUN = -1;   !IF NEW PASS START GPHARDS AT LUN 0
7090 ;          4402
7091 ;          4403          do
7092 ;ML4                                                         14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
7093 ;                                                           14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (50)
```

```
7094
7095 ;          4404              begin
7096 ;          4405              ML_LUN = .ML_LUN + 1;                   !IF NOT GET NEXT LUN PTABLE
7097 ;          4406
7098 ;          4407              if .ML_LUN geq .L$UNIT then DOCLN;      !START OVER IF ALL UNITS ARE TESTED
7099 ;          4408
7100 ;          4409              end
7101 ;          4410          until (GPHARD (.ML_LUN, PTBL_PTR)) neq 0;       !REPEAT UNTIL A ZERO IS NOT RETURNED
7102 ;          4411
7103 ;          4412          end;
7104 ;          4413
7105 ;          4414      PAR_DIS = .((.PTBL_PTR) + 12);                  !GET PARITY DISABLE FLAG
7106 ;          4415      ML_DUT = .((.PTBL_PTR) + 10);                   !GET DRIVE NUMBER
7107 ;          4416      OP_NUM_ARR = .((.PTBL_PTR) + 6) - 1;            !GET OPERATOR NUMBER OF ARRAYS
7108 ;          4417      GOOD_BLK = ZEROES;                              !INIT GOOD BLOCK TO BLOCK ZERO
7109 ;          4418      ARR_16 = ZEROES;                                !INIT ARRAY 16 TO ZERO
7110 ;          4419      LST_ARR = ZEROES;                               !INIT LAST ARRAY TO ZERO
7111 ;          4420      LST_BLK = ZEROES;                               !INIT LAST BLOCK TO ZERO
7112 ;          4421
7113 ;          4422      if .((.PTBL_PTR) + 8) IS_SET                    !CALCULATE ML11 16K MOS RAM PARAMETERS
7114 ;          4423      then
7115 ;          4424          begin
7116 ;          4425          DRIVE_TYPE = %o'000110';                    !EXPECTED DRIVE TYPE VALUE
7117 ;          4426          W_C_SIZE = %o'140000';                      !WORD COUNT SIZE FOR 16K WORD XFER
7118 ;          4427          RAS_INC = %o'200';                          !RAS INCREMENT FOR 16K RAMS
7119 ;          4428          CHIP_SIZ = 16;                              !CHIP SIZE
7120 ;          4429          ARR_INC = %o'1000';                         !ARRAY INCREMENT
7121 ;          4430          ARR_16<9, 4> = %o'17';                      !ARRAY 16
7122 ;          4431          LST_ARR<9, 4> = .OP_NUM_ARR;                !LAST ARRAY
7123 ;          4432          LST_BLK<9, 4> = .OP_NUM_ARR;                !LAST BLOCK
7124 ;          4433          LST_BLK = .LST_BLK or %o'777';
7125 ;          4434          end
7126 ;          4435      else                                            !CALCULATE ML11 64K MOS RAM PARAMETERS
7127 ;          4436          begin
7128 ;          4437          DRIVE_TYPE = %o'000111';                    !EXPECTED DRIVE TYPE VALUE
7129 ;          4438          W_C_SIZE = %o'000000';                      !WORD COUNT SIZE FOR 64K WORD XFER
7130 ;          4439          RAS_INC = %o'1000';                         !RAS INCREMENT FOR 64K RAMS
7131 ;          4440          CHIP_SIZ = 64;                              !CHIP SIZE
7132 ;          4441          ARR_INC = %o'4000';                         !ARRAY INCREMENT
7133 ;          4442          ARR_16<11, 4> = %o'74';                     !ARRAY 16
7134 ;          4443          LST_ARR<11, 4> = .OP_NUM_ARR;               !LAST ARRAY
7135 ;          4444          LST_BLK<11, 4> = .OP_NUM_ARR;               !LAST BLOCK
7136 ;          4445          LST_BLK = .LST_BLK or %o'3777';
7137 ;          4446          end;
7138 ;          4447
7139 ;          4448      if .((.PTBL_PTR) + 2) eql %o'70' then LST_DUT_REG = 21 else LST_DUT_REG = 19;
7140 ;          4449
7141 ;          4450      PRINTB (FMT_17, .ML_LUN);                       !TELL OPERATOR WHICH UNIT IS BEING TESTED
7142 ;          4451      CLR_MBUS;                                       !CLEAR MASS BUS
7143 ;          4452      end;
7144 ;          4453
7145 ;          4454  ENDINIT;
7152
7153                                      .GLOBL  L$UNIT
7154
7155
7156                                      .SBTTL  LINIT
```

```
7160 024722 004167 157132          LINIT: JSR    R1,$SAVE3                    ;                                    4350
7161 024726 012700 000036                 MOV    #36,R0                       ;                                    4368
7162 024732 104447                        TRAP   47
7163 024734 103001                        BHIS   1$
7164 024736 000207                        RTS    PC
7165 024740 012700 000040          1$:    MOV    #40,R0                       ;                                    4372
7166 024744 104447                        TRAP   47
7167 024746 103061                        BHIS   5$
7168 024750 012767 177777 166622          MOV    #-1,ML.LUN                   ;                                    4375
7169 024756 005267 166616          2$:    INC    ML.LUN                       ;                                    4379
7170 024762 026767 166612 155022          CMP    ML.LUN,L$UNIT                ;                                    4381
7171 024770 002401                        BLT    3$
7172 024772 104444                        TRAP   44
7173 024774 016700 166600          3$:    MOV    ML.LUN,R0                    ;                                    4384
7174 025000 104442                        TRAP   42
7175 025002 010067 164550                 MOV    R0,PTBL.PTR
7176 025006 005767 164544                 TST    PTBL.PTR
7177 025012 001761                        BEQ    2$
7178 025014 017767 164536 166550          MOV    @PTBL.PTR,RH.ADD             ;                                    4386
7179 025022 016701 164530                 MOV    PTBL.PTR,R1                  ;                                    4387
7180 025026 016167 000002 166540          MOV    2(R1),RH.TYP
7181 025034 016701 164516                 MOV    PTBL.PTR,R1                  ;                                    4388
7182 025040 016167 000004 166530          MOV    4(R1),RH.VEC
7183 025046 005002                        CLR    R2                           ; OFFSET                             4389
7184 025050 005001                        CLR    R1                           ; COUNT                              4391
7185 025052 010100                 4$:    MOV    R1,R0                        ; COUNT,*                            4393
7186 025054 006300                        ASL    R0
7187 025056 006300                        ASL    R0
7188 025060 006300                        ASL    R0
7189 025062 016703 166504                 MOV    RH.ADD,R3
7190 025066 060203                        ADD    R2,R3                        ; OFFSET,*
7191 025070 010360 013154                 MOV    R3,ML.REG(R0)
7192 025074 062702 000002                 ADD    #2,R2                        ; *,OFFSET                           4394
7193 025100 005201                        INC    R1                           ; COUNT                              4391
7194 025102 020127 000025                 CMP    R1,#25                       ; COUNT,*
7195 025106 003761                        BLE    4$
7196 025110 000426                        BR     8$                           ;                                    4372
7197 025112 012700 000035          5$:    MOV    #35,R0                       ;                                    4401
7198 025116 104447                        TRAP   47
7199 025120 103003                        BHIS   6$
7200 025122 012767 177777 166450          MOV    #-1,ML.LUN
7201 025130 005267 166444          6$:    INC    ML.LUN                       ;                                    4405
7202                               ;ML4                                                    14-May-1981 13:48:54  TOPS
7203                               ;                                                       14-May-1981 13:05:08  PA:<
7204
7205 025134 026767 166440 154650          CMP    ML.LUN,L$UNIT                ;                                    4407
7206 025142 002401                        BLT    7$
7207 025144 104444                        TRAP   44
7208 025146 016700 166426          7$:    MOV    ML.LUN,R0                    ;                                    4410
7209 025152 104442                        TRAP   42
7210 025154 010067 164376                 MOV    R0,PTBL.PTR
7211 025160 005767 164372                 TST    PTBL.PTR
7212 025164 001761                        BEQ    6$
7213 025166 016701 164364          8$:    MOV    PTBL.PTR,R1                  ;                                    4414
7214 025172 016167 000014 164366          MOV    14(R1),PAR.DIS
7215 025200 016701 164352                 MOV    PTBL.PTR,R1                  ;                                    4415
7216 025204 016167 000012 166370          MOV    12(R1),ML.DUT
```

```
7217 025212  016701  164340                MOV     PTBL.PTR,R1                ;                                                4416
7218 025216  016103  000006                MOV     6(R1),R3
7219 025222  005303                        DEC     R3
7220 025224  010367  164330                MOV     R3,OP.NUM.ARR
7221 025230  005067  164330                CLR     GOOD.BLK                   ;                                                4417
7222 025234  005067  164334                CLR     ARR.16                     ;                                                4418
7223 025240  005067  164332                CLR     LST.ARR                    ;                                                4419
7224 025244  005067  164322                CLR     LST.BLK                    ;                                                4420
7225 025250  016701  164302                MOV     PTBL.PTR,R1                ;                                                4422
7226 025254  026127  000010  000001        CMP     10(R1),#1
7227 025262  001054                        BNE     9$
7228 025264  012767  000110  165640        MOV     #110,DRIVE.TYPE            ;                                                4425
7229 025272  012767  140000  165622        MOV     #-40000,W.C.SIZE           ;                                                4426
7230 025300  012767  000200  165616        MOV     #200,RAS.INC               ;                                                4427
7231 025306  012767  000020  164254        MOV     #20,CHIP.SIZ               ;                                                4428
7232 025314  012767  001000  164240        MOV     #1000,ARR.INC              ;                                                4429
7233 025322  052767  017000  164244        BIS     #17000,ARR.16              ;                                                4430
7234 025330  016703  164224                MOV     OP.NUM.ARR,R3              ;                                                4431
7235 025334  000303                        SWAB    R3
7236 025336  006303                        ASL     R3
7237 025340  042703  160777                BIC     #160777,R3
7238 025344  042767  017000  164224        BIC     #17000,LST.ARR
7239 025352  050367  164220                BIS     R3,LST.ARR
7240 025356  016703  164176                MOV     OP.NUM.ARR,R3              ;                                                4432
7241 025362  000303                        SWAB    R3
7242 025364  006303                        ASL     R3
7243 025366  042703  160777                BIC     #160777,R3
7244 025372  042767  017000  164172        BIC     #17000,LST.BLK
7245 025400  050367  164166                BIS     R3,LST.BLK
7246 025404  052767  000777  164160        BIS     #777,LST.BLK               ;                                                4433
7247 025412  000461                        BR      10$                        ;                                                4422
7248 025414  012767  000111  165510  9$:   MOV     #111,DRIVE.TYPE            ;                                                4437
7249 025422  005067  165474                CLR     W.C.SIZE                   ;                                                4438
7250 025426  012767  001000  165470        MOV     #1000,RAS.INC              ;                                                4439
7251 025434  012767  000100  164126        MOV     #100,CHIP.SIZ              ;                                                4440
7252 025442  012767  004000  164112        MOV     #4000,ARR.INC              ;                                                4441
7253 025450  042767  074000  164116        BIC     #74000,ARR.16              ;                                                4442
7254 025456  052767  060000  164110        BIS     #60000,ARR.16
7255 025464  016703  164070                MOV     OP.NUM.ARR,R3              ;                                                4443
7256 025470  000303                        SWAB    R3
7257                              ;ML4                                                                14-May-1981 13:48:54    TOPS
7258                              ;                                                                   14-May-1981 13:05:08    PA:<
7259
7260 025472  006303                        ASL     R3
7261 025474  006303                        ASL     R3
7262 025476  006303                        ASL     R3
7263 025500  042703  103777                BIC     #103777,R3
7264 025504  042767  074000  164064        BIC     #74000,LST.ARR
7265 025512  050367  164060                BIS     R3,LST.ARR
7266 025516  016703  164036                MOV     OP.NUM.ARR,R3              ;                                                4444
7267 025522  000303                        SWAB    R3
7268 025524  006303                        ASL     R3
7269 025526  006303                        ASL     R3
7270 025530  006303                        ASL     R3
7271 025532  042703  103777                BIC     #103777,R3
7272 025536  042767  074000  164026        BIC     #74000,LST.BLK
7273 025544  050367  164022                BIS     R3,LST.BLK
```

```
 7274 025550  052767  003777  164014          BIS     #3777,LST.BLK                   ;                                4445
 7275 025556  016701  163774          10$:    MOV     PTBL.PTR,R1                     ;                                4448
 7276 025562  026127  000002  000070          CMP     2(R1),#70
 7277 025570  001004                          BNE     11$
 7278 025572  012767  000025  165334          MOV     #25,LST.DUT.REG
 7279 025600  000403                          BR      12$
 7280 025602  012767  000023  165324  11$:    MOV     #23,LST.DUT.REG
 7281 025610  016746  165764          12$:    MOV     ML.LUN,-(SP)                    ;                                4450
 7282 025614  012746  005306                  MOV     #FMT.17,-(SP)
 7283 025620  012746  000002                  MOV     #2,-(SP)
 7284 025624  010600                          MOV     SP,R0                           ; SP,*
 7285 025626  104414                          TRAP    14
 7286 025630  152777  000040  165356          BISB    #40,@ML.REG+40
 7287 025636  016703  165740                  MOV     ML.DUT,R3
 7288 025642  042703  177770                  BIC     #177770,R3
 7289 025646  142777  000007  165340          BICB    #7,@ML.REG+40
 7290 025654  150377  165334                  BISB    R3,@ML.REG+40
 7291 025660  062706  000006                  ADD     #6,SP                           ;                                4370
 7292 025664  000207                          RTS     PC                              ;                                4350
 7293
 7294                                 ; Routine Size:  242 words
 7295                                 ; Maximum stack depth per invocation:  7 words
 7300
 7301
 7305
 7306                                         .SBTTL  L$INIT
 7310 025666  004767  177030          L$INIT::JSR     PC,LINIT                        ;                                4452
 7311 025672  104411                          TRAP    11
 7312                                 ;ML4                                                    14-May-1981 13:48:54    TOPS
 7313                                 ;                                                       14-May-1981 13:05:08    PA:<
 7314
 7315 025674  000207                          RTS     PC
 7316
 7317                                 ; Routine Size:  4 words
 7318                                 ; Maximum stack depth per invocation:  0 words
 7323
 7324
 7325 ;          4455  !<BLF/PAGE>
```

```
7327 :ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
7328 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (51)
7329
7330 :          4456  !
7331 :          4457  BGNTST;
7332 :          4458
7333 :          4459  !++
7334 :          4460  ! TEST NUMBER:  TST 1
7335 :          4461  !
7336 :          4462  ! TEST NAME:              MASS BUS READY TEST
7337 :          4463  !
7338 :          4464  ! TEST DESCRIPTION:
7339 :          4465  !       TEST THE RH CONTROLLER FOR EXISTANCE
7340 :          4466  !       BY:
7341 :          4467  !
7342 :          4468  !       1.  WRITTING ONES TO THE RH CS2 REGISTER
7343 :          4469  !           RESULTING IN A MASS BUS CLEAR
7344 :          4470  !
7345 :          4471  !       2.  THEN READ THE CS2 REGISTER FOR CLEAR DATA
7346 :          4472  !
7347 :          4473  !--
7348 :          4474
7349 :          4475  CLR_MBUS;
7350 :          4476  MLCS1 = ZEROES;                          !CLEAR OUT CS1
7351 :          4477  MLCS2 = %o'177770';                      !LOAD CS2 WITH ONES  AND FORCE A MBUS CLEAR
7352 :          4478  DELAY (ONE_US);
7353 :          4479
7354 :          4480  if ((.MLCS2) and (%o'177670')) neq ZERO  !SEE IF CS2 GOT CLEARED
7355 :          4481  then
7356 :          4482      begin                                !REPORT ERROR IF NOT CLEARED
7357 :          4483      ERRDF (119, RH_ERROR, DUMPER);
7358 :          4484      PRINTB (THR_FMT, REG_17, FNC_23, PHR_4);
7359 :          4485      DODU (.ML_LUN);
7360 :          4486      DOCLN;
7361 :          4487      end;
7362 :          4488
7363 :          4489  ENDTST;
7367
7368                                        .SBTTL  $T1
7372 025676  010146                 $T1:   MOV     R1,-(SP)                 ;                          4454
7373 025700  005746                        TST     -(SP)
7374 025702  152777  000040  165304        BISB    #40,@ML.REG+40           ;                          4457
7375 025710  016701  165666               MOV     ML.DUT,R1
7376 025714  042701  177770               BIC     #177770,R1
7377 025720  142777  000007  165266        BICB    #7,@ML.REG+40
7378 025726  150177  165262               BISB    R1,@ML.REG+40
7379 025732  005077  165216               CLR     @ML.REG                  ;                          4476
7380 025736  012777  177770  165250        MOV     #-10,@ML.REG+40          ;                          4477
7381 025744  012700  000001               MOV     #1,R0                    ; *,$$TMP2                 4478
7382                               ;ML4                                                 14-May-1981 13:48:54    TOPS
7383                               ;                                                    14-May-1981 13:05:08    PA:<
7384
7385 025750  001410                 1$:    BEQ     4$
7386 025752  016701  154140               MOV     L$DLY,R1                 ; *,$$TMP1
7387 025756  001403                        BEQ     3$
7388 025760  005016                 2$:    CLR     (SP)                     ; $$TMP
7389 025762  005301                        DEC     R1                       ; $$TMP1
```

```
7390 025764  001375                    BNE     2$
7391 025766  005300              3$:   DEC     R0                              ; $$TMP2
7392 025770  000767                    BR      1$
7393 025772  032777  177670  165214  4$:   BIT     #-110,@ML.REG+40                ;                                       4480
7394 026000  001426                    BEQ     5$
7395 026002  104455                    TRAP    55                              ;                                       4483
7396 026004  000167                    .WORD   167
7397 026006  011060                    .WORD   RH.ERROR
7398 026010  024060                    .WORD   DUMPER
7399 026012  012746  007454            MOV     #PHR.4,-(SP)                    ;                                       4484
7400 026016  012746  010242            MOV     #FNC.23,-(SP)
7401 026022  012746  010420            MOV     #REG.17,-(SP)
7402 026026  012746  006034            MOV     #THR.FMT,-(SP)
7403 026032  012746  000004            MOV     #4,-(SP)
7404 026036  010600                    MOV     SP,R0                           ; SP,*
7405 026040  104414                    TRAP    14
7406 026042  016700  165532            MOV     ML.LUN,R0                       ;                                       4485
7407 026046  104451                    TRAP    51
7408 026050  104444                    TRAP    44
7409 026052  062706  000012            ADD     #12,SP                          ;                                       4482
7410 026056  005726              5$:   TST     (SP)+                           ;                                       4454
7411 026060  012601                    MOV     (SP)+,R1
7412 026062  000207                    RTS     PC
7413
7414                                   ; Routine Size:  59 words
7415                                   ; Maximum stack depth per invocation:  7 words
7420
7421
7425
7426                                           .SBTTL  T1
7430 026064                           T1::
7431 026064  004767  177606           1$:     JSR     PC,$T1                          ;                                       4487
7432 026070  104466                    TRAP    66
7433 026072  006000                    ROR     R0
7434 026074  103773                    BLO     1$
7435 026076  000207                    RTS     PC
7436
7437                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
7438                                   ;                                                       14-May-1981 13:05:08    PA:<
7439
7440                                   ; Routine Size:  6 words
7441                                   ; Maximum stack depth per invocation:  0 words
7446
7447
7448 ;          4490  !<BLF/PAGE>
```

```
                                                        14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                        14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (52)
:ML4
:
        4491  !
        4492  BGNTST;
        4493
        4494  !++
        4495  ! TEST NUMBER:  TST 2
        4496  !
        4497  ! TEST NAME:    MASS BUS HANDSHAKE TEST
        4498  !
        4499  ! TEST DESCRIPTION:
        4500  !       TEST MASS BUS TO UNIBUS COMMUMICATIONS
        4501  !       VIA THE CONTROL BUS BY:
        4502  !
        4503  !       1.  READING RH AND DRIVE REGISTERS AND
        4504  !           TEST THE NON EXISTANT DRIVE 'NED'
        4505  !           BIT
        4506  !
        4507  !--
        4508
        4509  local
        4510      SAVE,                                     !TEMPORARY SAVE LOCATION
        4511      DODU_FLG;                                 !DROP UNIT FLAG
        4512
        4513  DODU_FLG = ZERO;
        4514
        4515  incr REG_SEL from 0 to .LST_DUT_REG do        !TEST ALL PRESENT RH REGISTERS
        4516      begin
        4517      BGNSUB;                                   !START OF SCOPE LOOP
        4518      CLR_MBUS;
        4519      SAVE = ..ML_REG [.REG_SEL, REGISTER_ADD];  !READ THE REGISTER
        4520
        4521      if .NED IS_SET                            !DID READ CAUSE THE NED BIT TO SET
        4522      then
        4523          begin                                 !REPORT AN ERROR IF SET
        4524          ERRDF (120, RH_ERROR, DUMPER);
        4525          PRINTB (FIV_FMT, WRD_62, PHR_5, WRD_12, WRD_52, FNC_6);
        4526          PRINTB (FMT_11, .ML_REG [.REG_SEL, REGISTER_ADD]);
        4527          DODU_FLG = ONE;
        4528          end;
        4529
        4530      ENDSUB;                                   !END OF SCOPE LOOP
        4531      end;
        4532
        4533  if .DODU_FLG IS_SET
        4534  then
        4535      begin
        4536      DODU (.ML_LUN);
        4537      DOCLN;
        4538      end;
        4539
        4540  ENDTST;
```

```
7510
7511                                            .SBTTL  $T2
7515 026100  004167  156012            $T2:    JSR     R1,$SAVE5                       ;                       4489
7516 026104  005001                            CLR     R1                              ; DODU.FLG              4513
7517 026106  016704  165022                    MOV     LST.DUT.REG,R4                  ;                       4515
7518 026112  005002                            CLR     R2                              ; REG.SEL
7519 026114  000474                            BR      4$
7520 026116  010200                    1$:     MOV     R2,R0                           ; REG.SEL,*             4519
7521 026120  006300                            ASL     R0
7522 026122  006300                            ASL     R0
7523 026124  006300                            ASL     R0
7524 026126  010003                            MOV     R0,R3
7525 026130  104402                    2$:     TRAP    2                               ;                       4516
7526 026132  152777  000040  165054            BISB    #40,@ML.REG+40                  ;                       4517
7527 026140  016700  165436                    MOV     ML.DUT,R0
7528 026144  042700  177770                    BIC     #177770,R0
7529 026150  142777  000007  165036            BICB    #7,@ML.REG+40
7530 026156  150077  165032                    BISB    R0,@ML.REG+40
7531 026162  017305  013154                    MOV     @ML.REG(R3),R5                  ; *,SAVE                4519
7532 026166  032777  010000  165020            BIT     #10000,@ML.REG+40               ;                       4521
7533 026174  001440                            BEQ     3$
7534 026176  104455                            TRAP    55                              ;                       4524
7535 026200  000170                            .WORD   170
7536 026202  011060                            .WORD   RH.ERROR
7537 026204  024060                            .WORD   DUMPER
7538 026206  012746  010004                    MOV     #FNC.6,-(SP)                    ;                       4525
7539 026212  012746  007066                    MOV     #WRD.52,-(SP)
7540 026216  012746  006426                    MOV     #WRD.12,-(SP)
7541 026222  012746  007472                    MOV     #PHR.5,-(SP)
7542 026226  012746  007210                    MOV     #WRD.62,-(SP)
7543 026232  012746  006062                    MOV     #FIV.FMT,-(SP)
7544 026236  012746  000006                    MOV     #6,-(SP)
7545 026242  010600                            MOV     SP,R0                           ; SP,*
7546 026244  104414                            TRAP    14
7547 026246  016316  013154                    MOV     ML.REG(R3),(SP)                 ;                       4526
7548 026252  012746  004750                    MOV     #FMT.11,-(SP)
7549 026256  012746  000002                    MOV     #2,-(SP)
7550 026262  010600                            MOV     SP,R0                           ; SP,*
7551 026264  104414                            TRAP    14
7552 026266  012701  000001                    MOV     #1,R1                           ; *,DODU.FLG            4527
7553 026272  062706  000022                    ADD     #22,SP                          ;                       4523
7554 026276  104467                    3$:     TRAP    67                              ;                       4528
7555 026300  006000                            ROR     R0
7556 026302  103712                            BLO     2$
7557 026304  005202                            INC     R2                              ; REG.SEL               4515
7558 026306  020204                    4$:     CMP     R2,R4                           ; REG.SEL,*
7559 026310  003702                            BLE     1$
7560 026312  005301                            DEC     R1                              ; DODU.FLG              4533
```

```
                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                        ;                                                       14-May-1981 13:05:08    PA:<
                                BNE     5$
026314  001004
                                MOV     ML.LUN,R0                       ;                               4536
026316  016700  165256
                                TRAP    51
026322  104451
                                TRAP    44
026324  104444
                5$:     RTS     PC                                      ;                               4489
026326  000207

                ; Routine Size:  76 words
                ; Maximum stack depth per invocation:  15 words




                                .SBTTL  T2
026330
                T2::
                1$:     JSR     PC,$T2                          ;                               4538
026330  004767  177544
                        TRAP    66
026334  104466
                        ROR     R0
026336  006000
                        BLO     1$
026340  103773
                        RTS     PC
026342  000207

                ; Routine Size:  6 words
                ; Maximum stack depth per invocation:  0 words


;               4541    !<BLF/PAGE>
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (53)

;          4542                                         !
;          4543  BGNTST;
;          4544
;          4545  !++
;          4546  ! TEST NUMBER:  TST 3
;          4547  !
;          4548  ! TEST NAME:    DRIVE PRESENT TEST
;          4549  !
;          4550  ! TEST DESCRIPTION:
;          4551  !       THIS TEST READS THE DESIRED SECTOR
;          4552  !       ADDRESS REGISTER OF THE DRIVE UNDER
;          4553  !       TEST, DELAYS 100 US, THEN
;          4554  !       READS THE  NED BIT OF MLCS2
;          4555  !
;          4556  !       IF SET, AN ERROR MESSAGE IS
;          4557  !       PRINTED AND THE UNIT IS DROPPED
;          4558  !
;          4559  !--
;          4560
;          4561  local
;          4562      DODU_FLG,                          !DROP UNIT FLAG
;          4563      SAVE;                              !TEMP STORAGE LOCATION
;          4564
;          4565  DODU_FLG = ZERO;
;          4566  BGNSUB;
;          4567  CLR_MBUS;
;          4568  SAVE = .MLDA;                          !READ A DRIVE REGISTER
;          4569  DELAY (ONE_US);                        !DELAY 1 US
;          4570
;          4571  if .NED IS_SET                        !TEST THE NED BIT
;          4572  then
;          4573      begin
;          4574      ERRDF (1, ASYNC, DUMPER);          !IF SET THEN REPORT ERROR AND SET DODU_FLG
;          4575      PRINTB (ONE_FMT, PHR_3);
;          4576      DODU_FLG = ONE;
;          4577      end;
;          4578
;          4579  ENDSUB;
;          4580
;          4581  if .DODU_FLG IS_SET                    !DROP THIS UNIT IF DODU IS_SET
;          4582  then
;          4583      begin
;          4584      DODU (.ML_LUN);
;          4585      DOCLN;
;          4586      end;
;          4587
;          4588  ENDTST;
;
                                    .SBTTL  $T3
```

```
                                        ;ML4                                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                                       14-May-1981 13:05:08    PA:<
                                                                                                                                        4540
026344  004167  155526        $T3:    JSR     R1,$SAVE4               ;
026350  005746                        TST     -(SP)
026352  005003                        CLR     R3                      ; DODU.FLG                              4565
026354  104402                1$:     TRAP    2                                                               4566
026356  152777  000040  164630        BISB    #40,@ML.REG+40          ;
026364  016702  165212                MOV     ML.DUT,R2
026370  042702  177770                BIC     #177770,R2
026374  142777  000007  164612        BICB    #7,@ML.REG+40
026402  150277  164606                BISB    R2,@ML.REG+40
026406  017704  164572                MOV     @ML.REG+30,R4           ; *,SAVE                                4568
026412  012701  000001                MOV     #1,R1                   ; *,$$TMP2                              4569
026416  001410                2$:     BEQ     5$
026420  016702  153472                MOV     L$DLY,R2                ; *,$$TMP1
026424  001403                        BEQ     4$
026426  005016                3$:     CLR     (SP)                    ; $$TMP
026430  005302                        DEC     R2                      ; $$TMP1
026432  001375                        BNE     3$
026434  005301                4$:     DEC     R1                      ; $$TMP2
026436  000767                        BR      2$
026440  032777  010000  164546  5$:     BIT     #10000,@ML.REG+40       ;                                       4571
026446  001420                        BEQ     6$
026450  104455                        TRAP    55                      ;                                       4574
026452  000001                        .WORD   1
026454  010464                        .WORD   ASYNC
026456  024060                        .WORD   DUMPER
026460  012746  007422                MOV     #PHR.3,-(SP)            ;                                       4575
026464  012746  006016                MOV     #ONE.FMT,-(SP)
026470  012746  000002                MOV     #2,-(SP)
026474  010600                        MOV     SP,R0                   ; SP,*
026476  104414                        TRAP    14
026500  012703  000001                MOV     #1,R3                   ; *,DODU.FLG                            4576
026504  062706  000006                ADD     #6,SP                   ;                                       4573
026510  104467                6$:     TRAP    67                      ;                                       4577
026512  006000                        ROR     R0
026514  103717                        BLO     1$
026516  005303                        DEC     R3                      ; DODU.FLG                              4581
026520  001004                        BNE     7$
026522  016700  165052                MOV     ML.LUN,R0               ;                                       4584
026526  104451                        TRAP    51
026530  104444                        TRAP    44
026532  005726                7$:     TST     (SP)+                   ;                                       4540
026534  000207                        RTS     PC

                                ; Routine Size:  61 words
                                ; Maximum stack depth per invocation:  9 words
```

```
 7716 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 7717 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (53)
 7718
 7722
 7723                                    .SBTTL  T3
 7727 026536                        T3::
 7728 026536  004767  177602        1$:     JSR     PC,$T3                          ;                              4586
 7729 026542  104466                        TRAP    66
 7730 026544  006000                        ROR     R0
 7731 026546  103773                        BLO     1$
 7732 026550  000207                        RTS     PC
 7733
 7734                               ; Routine Size:  6 words
 7735                               ; Maximum stack depth per invocation:  0 words
 7740
 7741
 7742 ;          4589  !<BLF/PAGE>
```

```
:ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
:                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (54)

:          4590  !
:          4591  BGNTST;
:          4592
:          4593  !++
:          4594  ! TEST NUMBER:  TST 4
:          4595  !
:          4596  ! TEST NAME:    DRIVE SELECTION TEST
:          4597  !
:          4598  ! TEST DESCRIPTION:
:          4599  !       THIS TEST TESTS FOR UNIQUE DRIVE SELECTION BY WRITING THE DRIVE
:          4600  !       UNDER TEST (DUT) DRIVE NUMBER INTO ITS DSA REG.  THEN WRITING THE DRIVE
:          4601  !       NUMBERS OF OTHER DRIVES INTO THEIR RESPECTIVE DSA REGISTERS
:          4602  !       AND READING THE DUT DSA FOR ITS DRIVE NUMBER.
:          4603  !
:          4604  ! IMPLICIT INPUTS:
:          4605  !       ML_DUT
:          4606  !       LOADED DURING THE INITIALIZATION CODE AND CONTAINS THE DRIVE
:          4607  !       NUMBER OF THE DRIVE PRESENTLY BEING TESTED.
:          4608  !--
:          4609
:          4610  local
:          4611      DODU_FLG,                                 !DROP UNIT FLAG
:          4612      SAVE;                                     !TEMPORARY SAVE LOCATION
:          4613
:          4614  BGNSUB;
:          4615  CLR_MBUS;
:          4616  DODU_FLG = ZERO;
:          4617  MLDA = .ML_DUT;                               !LOAD THIS DRIVES DRIVE NO. INTO ITS DSA REG
:          4618  SAVE = .MLDA;                                 !READ THE REGISTER BACK
:          4619
:          4620  if .SAVE neq .ML_DUT                          !SEE IF DSA HAS DRIVE NUMBER
:          4621  then
:          4622      begin
:          4623      ERRDF (2, INTER, DUMPER);                 !ERROR AND EXIT TEST IF DSA NEQ DRIVE NUM
:          4624      PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_3, WRD_37, WRD_13, REG_6);
:          4625      PRINTB (FMT_2, .ML_DUT, .SAVE, (.ML_DUT xor .SAVE));
:          4626      EXIT_TST;
:          4627      end;
:          4628
:          4629  incr DRV_SEL from 0 to 7 do                   !WRITE DRV NO OF OTHER DRIVES INTO THEIR RESPECTIVE DSA REG.
:          4630
:          4631      if .DRV_SEL neq .ML_DUT                   !SKIP IF .DRV_SEL EQL TO THE DRIVE UNDER TEST (DUT)
:          4632      then
:          4633          begin
:          4634          DRV_NUM = .DRV_SEL;                   !SELECT DRIVE TO BE WRITTEN TO
:          4635          MLDA = .DRV_SEL;                      !WRITE DRIVE SEL NO. INTO ITS DSA REG
:          4636          DELAY (ONE_US);                       !DELAY 1 US
:          4637          end;
:          4638
:          4639  DRV_NUM = .ML_DUT;                            !SELECT THE DUT
:          4640  SAVE = .MLDA;                                 !READ ITS DSA REG
:          4641
```

```
                                                                                14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                                14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (54)

7800 :ML4
7801 :
7802
7803 :          4642  if .SAVE neq .ML_DUT                                      !SEE IF WRITTING TO OTHER DRIVES CHANGE ITS VALUE
7804 :          4643  then
7805 :          4644      begin
7806 :          4645      ERRDF (3, ASYNC, DUMPER);                             !ERROR AND SET DODU_FLG IF CHANGED
7807 :          4646      PRINTB (THR_FMT, FNC_3, WRD_37, WRD_14);
7808 :          4647      PRINTB (FMT_1, .ML_DUT, .SAVE);
7809 :          4648      DODU_FLG = ONE;
7810 :          4649      end;
7811 :          4650
7812 :          4651  ENDSUB;
7813 :          4652
7814 :          4653  if .DODU_FLG IS_SET                                       !DROP UNIT IF DODU_FLG IS_SET
7815 :          4654  then
7816 :          4655      begin
7817 :          4656      DODU (.ML_LUN);
7818 :          4657      DOCLN;
7819 :          4658      end;
7820 :          4659
7821 :          4660  ENDTST;
7825
7826                                        .SBTTL  $T4
7830 026552  004167  155340          $T4:  JSR     R1,$SAVE5                       ;                                       4588
7831 026556  005746                        TST     -(SP)
7832 026560  104402                  1$:   TRAP    2                               ;                                       4612
7833 026562  152777  000040  164424        BISB    #40,@ML.REG+40                  ;                                       4614
7834 026570  016703  165006              MOV     ML.DUT,R3
7835 026574  042703  177770              BIC     #177770,R3
7836 026600  142777  000007  164406        BICB    #7,@ML.REG+40
7837 026606  150377  164402              BISB    R3,@ML.REG+40
7838 026612  005005                      CLR     R5                              ; DODU.FLG                              4616
7839 026614  016777  164762  164362        MOV     ML.DUT,@ML.REG+30               ;                                       4617
7840 026622  017704  164356              MOV     @ML.REG+30,R4                   ; *,SAVE                                4618
7841 026626  020467  164750              CMP     R4,ML.DUT                       ; SAVE,*                                4620
7842 026632  001451                      BEQ     2$
7843 026634  104455                      TRAP    55                              ;                                       4623
7844 026636  000002                      .WORD   2
7845 026640  010672                      .WORD   INTER
7846 026642  024060                      .WORD   DUMPER
7847 026644  012746  010316              MOV     #REG.6,-(SP)                    ;                                       4624
7848 026650  012746  006436              MOV     #WRD.13,-(SP)
7849 026654  012746  006700              MOV     #WRD.37,-(SP)
7850 026660  012746  007750              MOV     #FNC.3,-(SP)
7851 026664  012746  006426              MOV     #WRD.12,-(SP)
7852 026670  012746  007454              MOV     #PHR.4,-(SP)
7853 026674  012746  006100              MOV     #SIX.FMT,-(SP)
7854 026700  012746  000007              MOV     #7,-(SP)
```

```
                                                                                    14-May-1981 13:48:54    TOPS
                                                                                    14-May-1981 13:05:08    PA:<
                        :ML4
                        :
                                MOV     SP,R0                   ; SP,*
                                TRAP    14
                                MOV     ML.DUT,(SP)             ;                                       4625
                                MOV     R4,R3                   ; SAVE,*
                                BIC     (SP),R3
                                BIC     R4,(SP)                 ; SAVE,*
                                BIS     R3,(SP)
                                MOV     R4,-(SP)                ; SAVE,*
                                MOV     ML.DUT,-(SP)
                                MOV     #FMT.2,-(SP)
                                MOV     #4,-(SP)
                                MOV     SP,R0                   ; SP,*
                                TRAP    14
                                TRAP    63
                                ADD     #30,SP                  ;                                       4620
                                BR      10$                     ;                                       4622
                        2$:     CLR     R3                      ; DRV.SEL                               4629
                        3$:     CMP     R3,ML.DUT               ; DRV.SEL,*                             4631
                                BEQ     7$
                                MOV     R3,R2                   ; DRV.SEL,*                             4634
                                BIC     #177770,R2
                                BICB    #7,@ML.REG+40
                                BISB    R2,@ML.REG+40
                                MOV     R3,@ML.REG+30           ; DRV.SEL,*                             4635
                                MOV     #1,R1                   ; *,$$TMP2                              4636
                        4$:     BEQ     7$
                                MOV     L$DLY,R2                ; *,$$TMP1
                                BEQ     6$
                        5$:     CLR     (SP)                    ; $$TMP
                                DEC     R2                      ; $$TMP1
                                BNE     5$
                        6$:     DEC     R1                      ; $$TMP2
                                BR      4$
                        7$:     INC     R3                      ; DRV.SEL                               4629
                                CMP     R3,#7                   ; DRV.SEL,*
                                BLE     3$
                                MOV     ML.DUT,R3               ;                                       4639
                                BIC     #177770,R3
                                BICB    #7,@ML.REG+40
                                BISB    R3,@ML.REG+40
                                MOV     @ML.REG+30,R4           ; *,SAVE                                4640
                                CMP     R4,ML.DUT               ; SAVE,*                                4642
                                BEQ     8$
                                TRAP    55                      ;                                       4645
                                .WORD   3
                                .WORD   ASYNC
                                .WORD   DUMPER
                                MOV     #WRD.14,-(SP)           ;                                       4646
                                MOV     #WRD.37,-(SP)
                                MOV     #FNC.3,-(SP)
                                MOV     #THR.FMT,-(SP)
                                MOV     #4,-(SP)
```

```
                                                                                14-May-1981 13:48:54    TOPS
                                                                                14-May-1981 13:05:08    PA:<
                        ;ML4
                        ;
                                MOV     SP,R0                   ; SP,*
                                TRAP    14
                                MOV     R4,(SP)                 ; SAVE,*                                4647
                                MOV     ML.DUT,-(SP)
                                MOV     #FMT.1,-(SP)
                                MOV     #3,-(SP)
                                MOV     SP,R0                   ; SP,*
                                TRAP    14
                                MOV     #1,R5                   ; *,DODU.FLG                            4648
                                ADD     #20,SP                  ;                                       4644
                        8$:     TRAP    67                      ;                                       4649
                                ROR     R0
                                BHIS    9$
                                JMP     1$
                        9$:     DEC     R5                      ; DODU.FLG                              4653
                                BNE     10$
                                MOV     ML.LUN,R0               ;                                       4656
                                TRAP    51
                                TRAP    44
                        10$:    TST     (SP)+                   ;                                       4588
                                RTS     PC

                        ; Routine Size:  151 words
                        ; Maximum stack depth per invocation:  19 words


                                .SBTTL  T4
                        T4::
                        1$:     JSR     PC,$T4                  ;                                       4658
                                TRAP    66
                                ROR     R0
                                BLO     1$
                                RTS     PC

                        ; Routine Size:  6 words
                        ; Maximum stack depth per invocation:  0 words
                ;       4661    !<BLF/PAGE>
```

```
7968 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
7969 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (55)
7970
7971 ;          4662  !
7972 ;          4663  BGNTST;
7973 ;          4664
7974 ;          4665  !++
7975 ;          4666  ! TEST NUMBER:  TST 5
7976 ;          4667  !
7977 ;          4668  ! TEST NAME:    READ WRITE REG ONES/ZEROES TEST
7978 ;          4669  !
7979 ;          4670  ! TEST DESCRIPTION:
7980 ;          4671  !       THIS TEST WRITES AND READS A DATA PATTERN OF ALL ONES AND ZEROES TO ALL
7981 ;          4672  !       OF THE ML11'S READ / WRITE REGISTERS.
7982 ;          4673  !
7983 ;          4674  !       ROUTINES WRT_REG AND RD_REG ACCEPT ARGUMENTS TO FURTHER SELECT ROUTINES
7984 ;          4675  !       WHICH ACTUALLY PERFORMS THE READING AND WRITING OF THE REGISTERS.
7985 ;          4676  !
7986 ;          4677  !       THE UNIT IS DROPPED ON DETECTED ERRORS.
7987 ;          4678  !
7988 ;          4679  ! IMPLICIT INPUTS:
7989 ;          4680  !       WT_DATA
7990 ;          4681  !       LOADED BY READ REGISTER ROUTINES AND CONTAINS THE DATA PATTERN WRITTEN
7991 ;          4682  !       TO THE REGISTERS (REPRESENTS GOOD DATA).
7992 ;          4683  !
7993 ;          4684  !       RD_DATA
7994 ;          4685  !       LOADED BY THE READ REGISTER ROUTINES AND CONTAINS THE DATA PATTERN
7995 ;          4686  !       READ FROM THE REGISTER (REPRESENTS BAD DATA).
7996 ;          4687  !--
7997 ;          4688
7998 ;          4689  local
7999 ;          4690      ERR_FLG,                          !ERROR FLAG PASSED TO ROUTINES
8000 ;          4691      TST_PAT,                          !TEST PATTERN
8001 ;          4692      index,                            !POINTS TO REGISTER PRESENTLY BEING TESTED
8002 ;          4693      DODU_FLG;                         !DROP UNIT FLAG
8003 ;          4694
8004 ;          4695  DODU_FLG = ZERO;
8005 ;          4696  TST_PAT = ONES;                       !LOAD TEST PAT WITH ONES
8006 ;          4697
8007 ;          4698  incr TWICE from 0 to 1 do             !REPEAT LOOP TWICE
8008 ;          4699      begin
8009 ;          4700
8010 ;          4701      incr REG_SEL from 0 to 7 do       !TEST ELEVEN WRITE/READ REGISTERS
8011 ;          4702          begin
8012 ;          4703          BGNSUB;
8013 ;          4704          CLR_MBUS;
8014 ;          4705          WRT_REG (.TST_PAT, .REG_SEL, index);   !WRITE TO THE REGISTER
8015 ;          4706          RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);  !READ THE REGISTER
8016 ;          4707
8017 ;          4708          if .ERR_FLG IS_SET                !SEE IF READ FOUND AN ERROR
8018 ;          4709          then
8019 ;          4710              begin                         !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
8020 ;          4711
8021 ;          4712              selectone .REG_SEL of         !SELECT WHICH MODULE FAILED
8022 ;          4713                  set
8023 ;ML4                                                    14-May-1931 13:48:54    TOPS-20 Bliss-16 V2(212)
8024 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (55)
```

```
8025
8026 ;          4714
8027 ;          4715                    [0 to 3] :
8028 ;          4716                        ERRDF (4, ASYNC, DUMPER);   !ASYNC MODULE FAILURE
8029 ;          4717
8030 ;          4718                    [4 to 5] :
8031 ;          4719                        ERRDF (4, SYNC, DUMPER);    !SYNC MODULE FAILURE
8032 ;          4720
8033 ;          4721                    [6 to 7] :
8034 ;          4722                        ERRDF (4, ARR_DAT, DUMPER); !ARRAY DATA MODULE FAILURE
8035 ;          4723                    tes;
8036 ;          4724
8037 ;          4725                PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
8038 ;          4726                PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
8039 ;          4727                DODU_FLG = ONE;
8040 ;          4728                end;
8041 ;          4729
8042 ;          4730            ENDSUB;
8043 ;          4731            end;
8044 ;          4732
8045 ;          4733        TST_PAT = not .TST_PAT;                     !REPEAT AGAIN WITH COMPLIMENT DATA
8046 ;          4734        end;
8047 ;          4735
8048 ;          4736    if .DODU_FLG IS_SET                             !DROP THIS UNIT IF THE DODU_FLG IS_SET
8049 ;          4737    then
8050 ;          4738        begin
8051 ;          4739        DODU (.ML_LUN);
8052 ;          4740        DOCLN;
8053 ;          4741        end;
8054 ;          4742
8055 ;          4743    ENDTST;
8059
8060                                    .SBTTL  $T5
8064 027244  004167  154626        $T5:  JSR     R1,$SAVE4             ;                                   4660
8065 027250  024646                      CMP     -(SP),-(SP)
8066 027252  005004                      CLR     R4                    ; DODU.FLG                          4695
8067 027254  012702  177777              MOV     #-1,R2                ; *,TST.PAT                         4696
8068 027260  005001                      CLR     R1                    ; TWICE                             4698
8069 027262  005003              1$:     CLR     R3                    ; REG.SEL                           4701
8070 027264  104402              2$:     TRAP    2                     ;                                   4702
8071 027266  152777  000040  163720      BISB    #40,@ML.REG+40        ;                                   4703
8072 027274  016700  164302              MOV     ML.DUT,R0
8073 027300  042700  177770              BIC     #177770,R0
8074 027304  142777  000007  163702      BICB    #7,@ML.REG+40
8075 027312  150077  163676              BISB    R0,@ML.REG+40
8076 027316  010246                      MOV     R2,-(SP)              ; TST.PAT,*                         4705
8077 027320  010346                      MOV     R3,-(SP)              ; REG.SEL,*
8078                             ;ML4                                                14-May-1981 13:48:54    TOPS
8079                             ;                                                   14-May-1981 13:05:08    PA:<
8080
8081 027322  012746  000010              MOV     #10,-(SP)
8082 027326  060616                      ADD     SP,(SP)               ; INDEX,*
8083 027330  004767  173546              JSR     PC,WRT.REG
8084 027334  010216                      MOV     R2,(SP)               ; TST.PAT,*                         4706
8085 027336  010346                      MOV     R3,-(SP)              ; REG.SEL,*
8086 027340  012746  000012              MOV     #12,-(SP)
8087 027344  060616                      ADD     SP,(SP)               ; ERR.FLG,*
```

```
 8088 027346  004767  174116                    JSR     PC,RD.REG
 8089 027352  026627  000012  000001            CMP     12(SP),#1          ; ERR.FLG,*                    4708
 8090 027360  001106                            BNE     6$
 8091 027362  005703                            TST     R3                 ; REG.SEL                      4712
 8092 027364  002410                            BLT     3$
 8093 027366  020327  000003                    CMP     R3,#3              ; REG.SEL,*
 8094 027372  003005                            BGT     3$
 8095 027374  104455                            TRAP    55                 ;                              4716
 8096 027376  000004                            .WORD   4
 8097 027400  010464                            .WORD   ASYNC
 8098 027402  024060                            .WORD   DUMPER
 8099 027404  000425                            BR      5$                 ;                              4712
 8100 027406  020327  000004          3$:       CMP     R3,#4              ; REG.SEL,*
 8101 027412  002410                            BLT     4$
 8102 027414  020327  000005                    CMP     R3,#5              ; REG.SEL,*
 8103 027420  003005                            BGT     4$
 8104 027422  104455                            TRAP    55                 ;                              4719
 8105 027424  000004                            .WORD   4
 8106 027426  010526                            .WORD   SYNC
 8107 027430  024060                            .WORD   DUMPER
 8108 027432  000412                            BR      5$                 ;                              4712
 8109 027434  020327  000006          4$:       CMP     R3,#6              ; REG.SEL,*
 8110 027440  002407                            BLT     5$
 8111 027442  020327  000007                    CMP     R3,#7              ; REG.SEL,*
 8112 027446  003004                            BGT     5$
 8113 027450  104455                            TRAP    55                 ;                              4722
 8114 027452  000004                            .WORD   4
 8115 027454  010570                            .WORD   ARR.DAT
 8116 027456  024060                            .WORD   DUMPER
 8117 027460  012746  007122          5$:       MOV     #WRD.56,-(SP)      ;                              4725
 8118 027464  012746  007066                    MOV     #WRD.52,-(SP)
 8119 027470  012746  010004                    MOV     #FNC.6,-(SP)
 8120 027474  012746  007774                    MOV     #FNC.5,-(SP)
 8121 027500  012746  006426                    MOV     #WRD.12,-(SP)
 8122 027504  012746  007454                    MOV     #PHR.4,-(SP)
 8123 027510  012746  006100                    MOV     #SIX.FMT,-(SP)
 8124 027514  012746  000007                    MOV     #7,-(SP)
 8125 027520  010600                            MOV     SP,R0              ; SP,*
 8126 027522  104414                            TRAP    14
 8127 027524  016716  163400                    MOV     RD.DATA,(SP)       ;                              4726
 8128 027530  016746  163372                    MOV     WT.DATA,-(SP)
 8129 027534  016600  000036                    MOV     36(SP),R0          ; INDEX,*
 8130 027540  006300                            ASL     R0
 8131 027542  006300                            ASL     R0
 8132 027544  006300                            ASL     R0
 8133                              ;ML4
 8134                              ;                                                  14-May-1981 13:48:54   TOPS
 8135                                                                               14-May-1981 13:05:08   PA:<
 8136 027546  016046  013154                    MOV     ML.REG(R0),-(SP)
 8137 027552  012746  005216                    MOV     #FMT.16,-(SP)
 8138 027556  012746  000004                    MOV     #4,-(SP)
 8139 027562  010600                            MOV     SP,R0              ; SP,*
 8140 027564  104414                            TRAP    14
 8141 027566  012704  000001                    MOV     #1,R4              ; *,DODU.FLG                   4727
 8142 027572  062706  000030                    ADD     #30,SP             ;                              4710
 8143 027576  062706  000012          6$:       ADD     #12,SP             ;                              4702
 8144 027602  104467                            TRAP    67                 ;                              4728
```

```
 8145 027604  006000                    ROR     R0
 8146 027606  103626                    BLO     2$
 8147 027610  005203                    INC     R3                      ; REG.SEL                       4701
 8148 027612  020327  000007            CMP     R3,#7                   ; REG.SEL,*
 8149 027616  003622                    BLE     2$
 8150 027620  005102                    COM     R2                      ; TST.PAT                       4733
 8151 027622  005201                    INC     R1                      ; TWICE                         4698
 8152 027624  020127  000001            CMP     R1,#1                   ; TWICE,*
 8153 027630  003614                    BLE     1$
 8154 027632  005304                    DEC     R4                      ; DODU.FLG                      4736
 8155 027634  001004                    BNE     7$
 8156 027636  016700  163736            MOV     ML.LUN,R0               ;                               4739
 8157 027642  104451                    TRAP    51
 8158 027644  104444                    TRAP    44
 8159 027646  022626            7$:     CMP     (SP)+,(SP)+             ;                               4660
 8160 027650  000207                    RTS     PC
 8161
 8162                           ; Routine Size:  131 words
 8163                           ; Maximum stack depth per invocation:  24 words
 8168
 8169
 8173
 8174                                   .SBTTL  T5
 8178 027652                    T5::
 8179 027652  004767  177366    1$:     JSR     PC,$T5                  ;                               4741
 8180 027656  104466                    TRAP    66
 8181 027660  006000                    ROR     R0
 8182 027662  103773                    BLO     1$
 8183 027664  000207                    RTS     PC
 8184
 8185                           ; Routine Size:  6 words
 8186                           ; Maximum stack depth per invocation:  0 words
 8194
 8195
 8196 ;          4744  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (56)

```
8198 ;ML4
8199 ;
8200
8201 ;          4745  !
8202 ;          4746  BGNTST;
8203 ;          4747
8204 ;          4748  !++
8205 ;          4749  ! TEST NUMBER:  TST 6
8206 ;          4750  !
8207 ;          4751  ! TEST NAME:    READ WRITE REG SHIFTING ONES/ZEROES TEST
8208 ;          4752  !
8209 ;          4753  ! TEST DESCRIPTION:
8210 ;          4754  !       THIS TEST WRITES AND READS A
8211 ;          4755  !       SHIFTING ONE'S AND SHIFTING ZEROE'S
8212 ;          4756  !       PATTERN TO ALL THE ML11'S
8213 ;          4757  !       READ/WRITE REGISTERS
8214 ;          4758  !
8215 ;          4759  !       ROUTINES WRT_REG AND RD_REG
8216 ;          4760  !       ACCEPT ARGUMENTS TO FURTHER
8217 ;          4761  !       SELECT ROUTINES WHICH ACTUALLY
8218 ;          4762  !       PERFORMS THE READING AND
8219 ;          4763  !       WRITING OF THE REGISTERS.
8220 ;          4764  !
8221 ;          4765  !       THE DRIVE IS DROPPED ON DETECTED
8222 ;          4766  !       ERRORS.
8223 ;          4767  !
8224 ;          4768  ! IMPLICIT INPUTS:
8225 ;          4769  !       WT_DATA
8226 ;          4770  !         LOADED BY READ REGISTER ROUTINES AND
8227 ;          4771  !         CONTAINS THE DATA PATTERN WRITTEN TO THE
8228 ;          4772  !         REGISTERS (REPRESENTS GOOD DATA).
8229 ;          4773  !
8230 ;          4774  !       RD_DATA
8231 ;          4775  !         LOADED BY THE READ REGISTER ROUTINES AND
8232 ;          4776  !         CONTAINS THE DATA PATTERN READ FROM THE
8233 ;          4777  !         REGISTER (REPRESENTS BAD DATA).
8234 ;          4778  !
8235 ;          4779  !
8236 ;          4780  !--
8237 ;          4781
8238 ;          4782  local
8239 ;          4783      ERR_FLG,                    !ERROR FLAG PASSED TO ROUTINE
8240 ;          4784      TST_PAT,                    !TEST PATTERN
8241 ;          4785      index,                      !POINTS TO REG PRESENTLY BEING TESTED
8242 ;          4786      DODU_FLG;                   !DROP UNIT FLAG
8243 ;          4787
8244 ;          4788  DODU_FLG = ZERO;
8245 ;          4789  TST_PAT = ONE;                  !LOAD TST_PAT WITH A 1 IN A FILED OF 0'S
8246 ;          4790
8247 ;          4791  incr SHIFT from 0 to 15 do      !DO SHIFT 16 TIMES
8248 ;          4792      begin
8249 ;          4793
8250 ;          4794      incr TWICE from 0 to 1 do   !REPEAT LOOP TWICE
8251 ;          4795          begin
8252 ;          4796
```

```
8254 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
8255 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (56)
8256
8257 ;          4797        incr REG_SEL from 0 to 7 do          !TEST ELEVEN READ/WRITE REGISTERS
8258 ;          4798            begin
8259 ;          4799            BGNSUB;
8260 ;          4800            CLR_MBUS;
8261 ;          4801            WRT_REG (.TST_PAT, .REG_SEL, index);        !WRITE TO THE RECISTER
8262 ;          4802            RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);       !READ THE REGISTER
8263 ;          4803
8264 ;          4804            if .ERR_FLG IS_SET                  !SEE IF THE READ FOUND AN ERROR
8265 ;          4805            then
8266 ;          4806                begin                           !IF THE ERROR FLAG IS_SET THEN ERROR
8267 ;          4807
8268 ;          4808                selectone .REG_SEL of           !FIND WHICH MODULE FAILED
8269 ;          4809                    set
8270 ;          4810
8271 ;          4811                    [0 to 3] :
8272 ;          4812                        ERRDF (5, ASYNC, DUMPER);       !ASYNC MODULE FAILURE
8273 ;          4813
8274 ;          4814                    [4 to 5] :
8275 ;          4815                        ERRDF (5, SYNC, DUMPER);        !SYNC MODULE FAILURE
8276 ;          4816
8277 ;          4817                    [6 to 7] :
8278 ;          4818                        ERRDF (5, ARR_DAT, DUMPER);     !ARRAY DATA MODULE FAILURE
8279 ;          4819                    tes;
8280 ;          4820
8281 ;          4821                PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
8282 ;          4822                PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
8283 ;          4823                DODU_FLG = ONE;
8284 ;          4824                end;
8285 ;          4825
8286 ;          4826            ENDSUB;
8287 ;          4827            end;
8288 ;          4828
8289 ;          4829        TST_PAT = not .TST_PAT;                 !REPEAT WITH A 0 IN A FIELD OF 1'S
8290 ;          4830        end;
8291 ;          4831
8292 ;          4832    TST_PAT = .TST_PAT^ONE;                     !SHIFT THE 1 IN THE FIELD OF 0'S
8293 ;          4833    end;
8294 ;          4834
8295 ;          4835  if .DODU_FLG IS_SET                           !DROP THIS UNIT IF DODU_FLG IS SET
8296 ;          4836  then
8297 ;          4837      begin
8298 ;          4838      DODU (.ML_LUN);
8299 ;          4839      DOCLN;
8300 ;          4840      end;
8301 ;          4841
8302 ;          4842  ENDTST;
8306
8307                                    .SBTTL  $T6
```

```
 8315 027666  004167  154224          $T6:    JSR     R1,$SAVE5                       ;                               4743
 8316 027672  024646                         CMP     -(SP),-(SP)
 8317 027674  005005                         CLR     R5                              ; DODU.FLG                      4788
 8318 027676  012703  000001                 MOV     #1,R3                           ; *,TST.PAT                     4789
 8319 027702  005001                         CLR     R1                              ; SHIFT                         4791
 8320 027704  005002                  1$:    CLR     R2                              ; TWICE                         4794
 8321 027706  005004                  2$:    CLR     R4                              ; REG.SEL                       4797
 8322 027710  104402                  3$:    TRAP    2                               ;                               4798
 8323 027712  152777  000040  163274         BISB    #40,@ML.REG+40                  ;                               4799
 8324 027720  016700  163656                 MOV     ML.DUT,R0
 8325 027724  042700  177770                 BIC     #177770,R0
 8326 027730  142777  000007  163256         BICB    #7,@ML.REG+40
 8327 027736  150077  163252                 BISB    R0,@ML.REG+40
 8328 027742  010346                         MOV     R3,-(SP)                        ; TST.PAT,*                     4801
 8329 027744  010446                         MOV     R4,-(SP)                        ; REG.SEL,*
 8330 027746  012746  000010                 MOV     #10,-(SP)
 8331 027752  060616                         ADD     SP,(SP)                         ; INDEX,*
 8332 027754  004767  173122                 JSR     PC,WRT.REG
 8333 027760  010316                         MOV     R3,(SP)                         ; TST.PAT,*                     4802
 8334 027762  010446                         MOV     R4,-(SP)                        ; REG.SEL,*
 8335 027764  012746  000012                 MOV     #12,-(SP)
 8336 027770  060616                         ADD     SP,(SP)                         ; ERR.FLG,*
 8337 027772  004767  173472                 JSR     PC,RD.REG
 8338 027776  026627  000012  000001         CMP     12(SP),#1                       ; ERR.FLG,*                     4804
 8339 030004  001106                         BNE     7$
 8340 030006  005704                         TST     R4                              ; REG.SEL                       4808
 8341 030010  002410                         BLT     4$
 8342 030012  020427  000003                 CMP     R4,#3                           ; REG.SEL,*
 8343 030016  003005                         BGT     4$
 8344 030020  104455                         TRAP    55                              ;                               4812
 8345 030022  000005                         .WORD   5
 8346 030024  010464                         .WORD   ASYNC
 8347 030026  024060                         .WORD   DUMPER
 8348 030030  000425                         BR      6$                              ;                               4808
 8349 030032  020427  000004          4$:    CMP     R4,#4                           ; REG.SEL,*
 8350 030036  002410                         BLT     5$
 8351 030040  020427  000005                 CMP     R4,#5                           ; REG.SEL,*
 8352 030044  003005                         BGT     5$
 8353 030046  104455                         TRAP    55                              ;                               4815
 8354 030050  000005                         .WORD   5
 8355 030052  010526                         .WORD   SYNC
 8356 030054  024060                         .WORD   DUMPER
 8357 030056  000412                         BR      6$                              ;                               4808
 8358 030060  020427  000006          5$:    CMP     R4,#6                           ; REG.SEL,*
 8359 030064  002407                         BLT     6$
 8360 030066  020427  000007                 CMP     R4,#7                           ; REG.SEL,*
 8361 030072  003004                         BGT     6$
 8362 030074  104455                         TRAP    55                              ;                               4818
 8363 030076  000005                         .WORD   5
 8364 030100  010570                         .WORD   ARR.DAT
```

```
8366                                    ;ML4                                                    14-May-1981 13:48:54    TOPS
8367                                    ;                                                       14-May-1981 13:05:08    PA:<
8368
8369 030102  024060                            .WORD   DUMPER
8370 030104  012746  007122          6$:       MOV     #WRD.56,-(SP)           ;                               4821
8371 030110  012746  007066                    MOV     #WRD.52,-(SP)
8372 030114  012746  010004                    MOV     #FNC.6,-(SP)
8373 030120  012746  007774                    MOV     #FNC.5,-(SP)
8374 030124  012746  006426                    MOV     #WRD.12,-(SP)
8375 030130  012746  007454                    MOV     #PHR.4,-(SP)
8376 030134  012746  006100                    MOV     #SIX.FMT,-(SP)
8377 030140  012746  000007                    MOV     #7,-(SP)
8378 030144  010600                           MOV     SP,R0                   ; SP,*
8379 030146  104414                           TRAP    14
8380 030150  016716  162754                    MOV     RD.DATA,(SP)            ;                               4822
8381 030154  016746  162746                    MOV     WT.DATA,-(SP)
8382 030160  016600  000036                    MOV     36(SP),R0               ; INDEX,*
8383 030164  006300                           ASL     R0
8384 030166  006300                           ASL     R0
8385 030170  006300                           ASL     R0
8386 030172  016046  013154                    MOV     ML.REG(R0),-(SP)
8387 030176  012746  005216                    MOV     #FMT.16,-(SP)
8388 030202  012746  000004                    MOV     #4,-(SP)
8389 030206  010600                           MOV     SP,R0                   ; SP,*
8390 030210  104414                           TRAP    14
8391 030212  012705  000001                    MOV     #1,R5                   ; *,DODU.FLG                    4823
8392 030216  062706  000030                    ADD     #30,SP                  ;                               4806
8393 030222  062706  000012          7$:       ADD     #12,SP                  ;                               4798
8394 030226  104467                           TRAP    67                      ;                               4824
8395 030230  006000                           ROR     R0
8396 030232  103626                           BLO     3$
8397 030234  005204                           INC     R4                      ; REG.SEL                       4797
8398 030236  020427  000007                    CMP     R4,#7                   ; REG.SEL,*
8399 030242  003622                           BLE     3$
8400 030244  005103                           COM     R3                      ; TST.PAT                       4829
8401 030246  005202                           INC     R2                      ; TWICE                         4794
8402 030250  020227  000001                    CMP     R2,#1                   ; TWICE,*
8403 030254  003614                           BLE     2$
8404 030256  006303                           ASL     R3                      ; TST.PAT                       4832
8405 030260  005201                           INC     R1                      ; SHIFT                         4791
8406 030262  020127  000017                    CMP     R1,#17                  ; SHIFT,*
8407 030266  003606                           BLE     1$
8408 030270  005305                           DEC     R5                      ; DODU.FLG                      4835
8409 030272  001004                           BNE     8$
8410 030274  016700  163300                    MOV     ML.LUN,R0               ;                               4838
8411 030300  104451                           TRAP    51
8412 030302  104444                           TRAP    44
8413 030304  022626                  8$:      CMP     (SP)+,(SP)+             ;                               4743
8414 030306  000207                           RTS     PC
8415
8416                                    ; Routine Size:  137 words
8417                                    ; Maximum stack depth per invocation:  25 words
```

```
 8426
 8427
 8431
 8432                                        .SBTTL  T6
 8436 030310                           T6::
 8437 030310  004767  177352           1$:     JSR     PC,$T6                          ;                4840
 8438 030314  104466                           TRAP    66
 8439 030316  006000                           ROR     R0
 8440 030320  103773                           BLO     1$
 8441 030322  000207                           RTS     PC
 8442
 8443                                  ; Routine Size:  6 words
 8444                                  ; Maximum stack depth per invocation:  0 words
 8449
 8450
 8451 ;          4843  !
 8452 ;          4844  !<BLF/PAGE>
```

```
8454 :ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
8455 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (57)
8456
8457 :          4845  !
8458 :          4846  BGNTST;
8459 :          4847
8460 :          4848  !++
8461 :          4849  ! TEST NUMBER:  TST 7
8462 :          4850  !
8463 :          4851  ! TEST NAME:    REGISTER INITIALIZATION TEST
8464 :          4852  !
8465 :          4853  ! TEST DESCRIPTION:
8466 :          4854  !       THIS TEST TESTS THE ABILITY OF
8467 :          4855  !       ALL ACCESSIBLE ML11 REGISTERS
8468 :          4856  !       TO CLEAR OUT REGISTER DATA OF
8469 :          4857  !       ONE'S AND ZEROES PATTERN.
8470 :          4858  !
8471 :          4859  !       ROUTINE WRT_REG WRITES A
8472 :          4860  !       PATTERN TO THE SELECTED REGISTER.
8473 :          4861  !
8474 :          4862  !       A MASS BUS CLEAR IS DONE.
8475 :          4863  !
8476 :          4864  !       THEN ROUTINE RD_REG READS THE
8477 :          4865  !       SELECTED REGISTER FOR CLEARED DATA
8478 :          4866  !       THE DRIVE IS DROPPED ON DETECTED ERRORS.
8479 :          4867  !
8480 :          4868  !       THIS TEST WILL ALSO READ THE
8481 :          4869  !       DRIVE TYPE REGISTER FOR ITS
8482 :          4870  !       INITIAL REGISTER VALUE.
8483 :          4871  !
8484 :          4872  ! IMPLICIT INPUTS:
8485 :          4873  !       THIS FLAG IS NEEDED DUE TO THE UNIQUE
8486 :          4874  !       MANNER IN WHICH THESE REGISTERS
8487 :          4875  !       MUST BE READ.
8488 :          4876  !
8489 :          4877  !       RD_DATA
8490 :          4878  !       LOADED BY THE READ REGISTER ROUTINE
8491 :          4879  !       AND CONTAINS THE DATA PATTERN READ FROM
8492 :          4880  !       THE REGISTER (REPRESENTS BAD DATA).
8493 :          4881  !
8494 :          4882  !       DRIVE TYPE
8495 :          4883  !       LOADED DURING THE INITIALIZATION CODE AND
8496 :          4884  !       STORES THE EXPECTED CONTENTS OF THE DRIVE
8497 :          4885  !       TYPE REGISTER.
8498 :          4886  !--
8499 :          4887
8500 :          4888  local
8501 :          4889      TST_PAT,                          !TEST PATTERN
8502 :          4890      ERR_FLG,                          !ERROR FLAG PASSED TO ROUTINE
8503 :          4891      index,                            !POINTS TO REG PRESENTLY BEING TESTED
8504 :          4892      CLR_DATA,                         !STORES CALCULATED REGISTER CLEAR DATA
8505 :          4893      SAVE,                             !TEMPORARY STORAGE LOCATION
8506 :          4894      DODU_FLG;                         !DROP UNIT FLAG
8507 :          4895
8508 :          4896  ML_REG [19, FORCE_HI] = %o'177777';   !CLR DATA FOR MLPD IS ONES
```

```
8510 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
8511 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (57)
8512
8513 ;          4897  DODU_FLG = ZERO;
8514 ;          4898  TST_PAT = ONES;                       !BACKGROUND PATTERN
8515 ;          4899
8516 ;          4900  incr TWICE from 0 to 1 do             !REPEAT LOOP TWICE
8517 ;          4901      begin
8518 ;          4902
8519 ;          4903      incr REG_SEL from 0 to 10 do      !TEST THIRTEEN REGISTERS
8520 ;          4904          begin
8521 ;          4905          BGNSUB;
8522 ;          4906          CLR_MBUS;
8523 ;          4907          WRT_REG (.TST_PAT, .REG_SEL, index);   !WRITE REGISTER WITH BACKGROUND
8524 ;          4908          CLR_DATA = (.HI) or (.IGNORE);         !CALCULATE THE CLEARED DATA PATTERN
8525 ;          4909          CLR_MBUS;                              !CLEAR THE REGISTER
8526 ;          4910          RD_REG (.CLR_DATA, .REG_SEL, ERR_FLG); !READ THE REGISTER FOR THE CLEARED DATA PAT
8527 ;          4911
8528 ;          4912          if .ERR_FLG IS_SET                     !SEE IF READ FOUND AN ERROR
8529 ;          4913          then
8530 ;          4914              begin                              !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
8531 ;          4915
8532 ;          4916              selectone .REG_SEL of              !FIND WHICH MODULE FAILED
8533 ;          4917                  set
8534 ;          4918
8535 ;          4919                  [0, 1, 2, 3, 9, 10] :
8536 ;          4920                      ERRDF (6, ASYNC, DUMPER);  !ASYNC MODULE FAILURE
8537 ;          4921
8538 ;          4922                  [4, 5, 8] :
8539 ;          4923                      ERRDF (6, SYNC, DUMPER);   !SYNC MODULE FAILURE
8540 ;          4924
8541 ;          4925                  [6 to 7] :
8542 ;          4926                      ERRDF (6, ARR_DAT, DUMPER); !ARRAY DATA MODULE
8543 ;          4927                  tes;
8544 ;          4928
8545 ;          4929              PRINTB (FIV_FMT, PHR_4, WRD_12, WRD_52, FNC_23, WRD_56);
8546 ;          4930              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .CLR_DATA, .RD_DATA);
8547 ;          4931              DODU_FLG = ONE;
8548 ;          4932              end;
8549 ;          4933
8550 ;          4934          ENDSUB;
8551 ;          4935          end;
8552 ;          4936
8553 ;          4937      TST_PAT = not .TST_PAT;                !REPEAT WITH COMPLIMENT BACKGROUND PAT
8554 ;          4938      end;
8555 ;          4939
8556 ;          4940  ML_REG [19, FORCE_HI] = ZEROES;          !RESTORE MLPD FORCED_HI
8557 ;          4941  !
8558 ;          4942  !
8559 ;          4943  !  NOW TEST THE DRIVE TYPE REGISTER
8560 ;          4944  !
8561 ;          4945  !
8562 ;          4946
8563 ;          4947  if .MLDT neq .DRIVE_TYPE                 !COMPARE REG CONTENTS TO CALCULATED VALUE
8564 ;          4948  then
```

```
8566 :ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
8567 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (57)
8568
8569 :          4949      begin
8570 :          4950      ERRDF (113, ASYNC, DUMPER);
8571 :          4951      PRINTB (TWO_FMT, REG_7, PHR_4);
8572 :          4952      PRINTB (FMT_2, .DRIVE_TYPE, .SAVE);
8573 :          4953      end;
8574 :          4954
8575 :          4955  if .DODU_FLG IS_SET                    !DROP THIS UNIT IF DODU_FLG IS_SET
8576 :          4956  then
8577 :          4957      begin
8578 :          4958      DODU (.ML_LUN);
8579 :          4959      DOCLN;
8580 :          4960      end;
8581 :          4961
8582 :          4962  ENDTST;
8586
8587                                        .SBTTL  $T7
8591 030324  004167  153566          $T7:  JSR     R1,$SAVE5                    ;                          4842
8592 030330  162706  000006                SUB     #6,SP                        ;
8593 030334  012767  177777  163044        MOV     #-1,ML.REG+232               ;                          4896
8594 030342  005005                        CLR     R5                           ; DODU.FLG                 4897
8595 030344  012702  177777                MOV     #-1,R2                       ; *,TST.PAT                4898
8596 030350  005001                        CLR     R1                           ; TWICE                    4900
8597 030352  005004                  1$:   CLR     R4                           ; REG.SEL                  4903
8598 030354  104402                  2$:   TRAP    2                            ;                          4904
8599 030356  152777  000040  162630        BISB    #40,@ML.REG+40               ;                          4905
8600 030364  016703  163212                MOV     ML.DUT,R3
8601 030370  042703  177770                BIC     #177770,R3
8602 030374  142777  000007  162612        BICB    #7,@ML.REG+40
8603 030402  150377  162606                BISB    R3,@ML.REG+40
8604 030406  010246                        MOV     R2,-(SP)                     ; TST.PAT,*                4907
8605 030410  010446                        MOV     R4,-(SP)                     ; REG.SEL,*
8606 030412  012746  000012                MOV     #12,-(SP)
8607 030416  060616                        ADD     SP,(SP)                      ; INDEX,*
8608 030420  004767  172456                JSR     PC,WRT.REG
8609 030424  016600  000012                MOV     12(SP),R0                    ; INDEX,*                  4908
8610 030430  006300                        ASL     R0
8611 030432  006300                        ASL     R0
8612 030434  006300                        ASL     R0
8613 030436  010003                        MOV     R0,R3
8614 030440  016300  013156                MOV     ML.REG+2(R3),R0
8615 030444  056300  013162                BIS     ML.REG+6(R3),R0
8616 030450  010066  000006                MOV     R0,6(SP)                     ; *,CLR.DATA
8617 030454  152777  000040  162532        BISB    #40,@ML.REG+40
8618 030462  016700  163114                MOV     ML.DUT,R0
8619 030466  042700  177770                BIC     #177770,R0
8620 030472  142777  000007  162514        BICB    #7,@ML.REG+40
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                                                                                        4910
030500  150077  162510                        BISB    R0,@ML.REG+40
030504  016616  000006                        MOV     6(SP),(SP)          ; CLR.DATA,*
030510  010446                                MOV     R4,-(SP)            ; REG.SEL,*
030512  012746  000014                        MOV     #14,-(SP)
030516  060616                                ADD     SP,(SP)             ; ERR.FLG,*
030520  004767  172744                        JSR     PC,RD.REG
030524  026627  000014  000001                CMP     14(SP),#1           ; ERR.FLG,*                 4912
030532  001110                                BNE     10$
030534  005704                                TST     R4                  ; REG.SEL                   4916
030536  002403                                BLT     3$
030540  020427  000003                        CMP     R4,#3               ; REG.SEL,*
030544  003406                                BLE     4$
030546  020427  000011                3$:     CMP     R4,#11              ; REG.SEL,*
030552  002410                                BLT     5$
030554  020427  000012                        CMP     R4,#12              ; REG.SEL,*
030560  003005                                BGT     5$
030562  104455                        4$:     TRAP    55                  ;                           4920
030564  000006                                .WORD   6
030566  010464                                .WORD   ASYNC
030570  024060                                .WORD   DUMPER
030572  000430                                BR      9$                  ;                           4916
030574  020427  000004                5$:     CMP     R4,#4               ; REG.SEL,*
030600  002403                                BLT     6$
030602  020427  000005                        CMP     R4,#5               ; REG.SEL,*
030606  003403                                BLE     7$
030610  020427  000010                6$:     CMP     R4,#10              ; REG.SEL,*
030614  001005                                BNE     8$
030616  104455                        7$:     TRAP    55                  ;                           4923
030620  000006                                .WORD   6
030622  010526                                .WORD   SYNC
030624  024060                                .WORD   DUMPER
030626  000412                                BR      9$                  ;                           4916
030630  020427  000006                8$:     CMP     R4,#6               ; REG.SEL,*
030634  002407                                BLT     9$
030636  020427  000007                        CMP     R4,#7               ; REG.SEL,*
030642  003004                                BGT     9$
030644  104455                                TRAP    55                  ;                           4926
030646  000006                                .WORD   6
030650  010570                                .WORD   ARR.DAT
030652  024060                                .WORD   DUMPER
030654  012746  007122                9$:     MOV     #WRD.56,-(SP)       ;                           4929
030660  012746  010242                        MOV     #FNC.23,-(SP)
030664  012746  007066                        MOV     #WRD.52,-(SP)
030670  012746  006426                        MOV     #WRD.12,-(SP)
030674  012746  007454                        MOV     #PHR.4,-(SP)
030700  012746  006062                        MOV     #FIV.FMT,-(SP)
030704  012746  000006                        MOV     #6,-(SP)
030710  010600                                MOV     SP,R0               ; SP,*
030712  104414                                TRAP    14
030714  016716  162210                        MOV     RD.DATA,(SP)        ;                           4930
030720  016646  000030                        MOV     30(SP),-(SP)        ; CLR.DATA,*
030724  016346  013154                        MOV     ML.REG(R3),-(SP)
```

```
                                                                                                14-May-1981 13:48:54    TOPS
                                                                                                14-May-1981 13:05:08    PA:<
                        ;ML4
                        ;
                        MOV     #FMT.16,-(SP)
                        MOV     #4,-(SP)
                        MOV     SP,R0                           ; SP,*
                        TRAP    14
                        MOV     #1,R5                           ; *,DODU.FLG                                            4931
                        ADD     #26,SP                          ;                                                       4914
10$:                    ADD     #12,SP                          ;                                                       4904
                        TRAP    67                              ;                                                       4932
                        ROR     R0
                        BHIS    12$
11$:                    JMP     2$
12$:                    INC     R4                              ; REG.SEL                                               4903
                        CMP     R4,#12                          ; REG.SEL,*
                        BLE     11$
                        COM     R2                              ; TST.PAT                                               4937
                        INC     R1                              ; TWICE                                                 4900
                        CMP     R1,#1                           ; TWICE,*
                        BGT     13$
                        JMP     1$
13$:                    CLR     ML.REG+232                      ;                                                       4940
                        CMP     @ML.REG+130,DRIVE.TYPE          ;                                                       4947
                        BEQ     14$
                        TRAP    55                              ;                                                       4950
                        .WORD   161
                        .WORD   ASYNC
                        .WORD   DUMPER
                        MOV     #PHR.4,-(SP)                    ;                                                       4951
                        MOV     #REG.7,-(SP)
                        MOV     #TWO.FMT,-(SP)
                        MOV     #3,-(SP)
                        MOV     SP,R0                           ; SP,*
                        TRAP    14
                        MOV     R4,(SP)                         ; SAVE,*                                                4952
                        MOV     DRIVE.TYPE,-(SP)
                        MOV     #FMT.2,-(SP)
                        MOV     #3,-(SP)
                        MOV     SP,R0                           ; SP,*
                        TRAP    14
                        ADD     #16,SP                          ;                                                       4949
14$:                    DEC     R5                              ; DODU.FLG                                              4955
                        BNE     15$
                        MOV     ML.LUN,R0                       ;                                                       4958
                        TRAP    51
                        TRAP    44
15$:                    ADD     #6,SP                           ;                                                       4842
                        RTS     PC

                ; Routine Size:  198 words
                ; Maximum stack depth per invocation:  25 words
```

```
 8738
 8739
 8743
 8744                                        .SBTTL  T7
 8748 031140                          T7::
 8749 031140  004767  177160          1$:    JSR     PC,$T7                          ;                4960
 8750 031144  104466                         TRAP    66
 8751 031146  006000                         ROR     R0
 8752 031150  103773                         BLO     1$
 8753 031152  000207                         RTS     PC
 8754
 8755                                 ; Routine Size:  6 words
 8756                                 ; Maximum stack depth per invocation:  0 words
 8761
 8762
 8763 ;          4963  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (58)

```
8765 :ML4
8766 :
8767
8768 :          4964  !
8769 :          4965  !
8770 :          4966  !
8771 :          4967  BGNTST;
8772 :          4968
8773 :          4969  !++
8774 :          4970  ! TEST NUMBER:  TST 8
8775 :          4971  !
8776 :          4972  ! TEST NAME:    REGISTER SELECTION TEST
8777 :          4973  !
8778 :          4974  ! TEST DESCRIPTION:
8779 :          4975  !       THIS TEST TESTS FOR UNIQUE REGISTER
8780 :          4976  !       SELECTION BY FIRST WRITING A BACKGROUND
8781 :          4977  !       PATTERN INTO ALL READ/WRITE REGISTERS
8782 :          4978  !
8783 :          4979  !       IT THEN WRITES A COMPLIMENT
8784 :          4980  !       BACKGROUND PATTERN INTO ONE REGISTER
8785 :          4981  !       AND READS THE REMAINING UNWRITTEN
8786 :          4982  !       REGISTERS FOR AN UNCHANGED BACKGROUND
8787 :          4983  !       PAT
8788 :          4984  !
8789 :          4985  !       THIS PROCEDURE IS REPEATED UNTIL ALL
8790 :          4986  !       REGISTERS HAVE BEEN WRITTEN WITH A
8791 :          4987  !       COMPLIMENT BACKGROUND PATTERN.
8792 :          4988  !
8793 :          4989  !--
8794 :          4990
8795 :          4991  local
8796 :          4992      DODU_FLG,                       !DROP UNIT FLAG
8797 :          4993      TST_PAT,                        !TEST PATTERN
8798 :          4994      ERR_FLG,                        !ERROR FLAG PASSED TO ROUTINE;
8799 :          4995      index;                          !POINTS TO REGISTER PRESENTLY BEING TESTED.
8800 :          4996
8801 :          4997  BGNSUB;
8802 :          4998  CLR_MBUS;
8803 :          4999  DODU_FLG = ZERO;
8804 :          5000  TST_PAT = %o'125252';               !LOAD TST_PAT WITH ALTERNATE 1'S & 0'S
8805 :          5001  WRT_CS1 (.TST_PAT, 0);              !WRITE A BACKGROUND INTO ALL THE DIRECTLY
8806 :          5002  WRT_ER (.TST_PAT, 6);               !ACCESSABLE READ WRITE REGISTERS
8807 :          5003  WRT_DA (.TST_PAT, 3);
8808 :          5004  WRT_PA (.TST_PAT, 8);
8809 :          5005  WRT_E1 (.TST_PAT, 13);
8810 :          5006  WRT_E2 (.TST_PAT, 14);
8811 :          5007
8812 :          5008  incr CNT_1 from 0 to 4 do           !WRITE A COMPLIMENT PATTERN INTO ONE REGISTER
8813 :          5009      begin
8814 :          5010      TST_PAT = not .TST_PAT;         !GENERATE THE COMPLIMENT PAT
8815 :          5011
8816 :          5012      case .CNT_1 from 0 to 4 of      !SELECT THE REGISTER TO WRITE INTO
8817 :          5013          set
8818 :          5014
8819 :          5015              [0] :
```

```
8821 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
8822 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (58)
8823 ;
8824 ;          5016            WRT_CS1 (.TST_PAT, 0);              !FIRST PASS WRITE COMP PAT TO MLCS1
8825 ;          5017
8826 ;          5018        [1] :
8827 ;          5019            WRT_ER (.TST_PAT, 6);               !SECOND PASS WRITE COMP PAT TO MLER
8828 ;          5020
8829 ;          5021        [2] :
8830 ;          5022            WRT_DA (.TST_PAT, 3);               !THIRD PASS WRITE COMP PAT TO MLDA
8831 ;          5023
8832 ;          5024        [3] :
8833 ;          5025            WRT_PA (.TST_PAT, 8);               !FORTH PASS WRITE COMP PAT TO MLPA
8834 ;          5026
8835 ;          5027        [4] :
8836 ;          5028            WRT_E1 (.TST_PAT, 13);              !FIFTH PASS WRITE COMP PAT TO MLE1
8837 ;          5029        tes;
8838 ;          5030
8839 ;          5031    TST_PAT = not .TST_PAT;                     !COMPLIMENT TST_PAT BACK TO BACKGROUND
8840 ;          5032
8841 ;          5033    incr CNT_2 from .CNT_1 + 1 to 5 do          !NOW READ THE REMAINING UNWRITTEN REGISTERS FOR AN
8842 ;          5034        begin                                   !UNCHANGED BACKGROUND
8843 ;          5035
8844 ;          5036        case .CNT_2 from 0 to 5 of              !SELECT THE REGISTER TO READ
8845 ;          5037            set
8846 ;          5038
8847 ;          5039            [0] :
8848 ;          5040                RD_CS1 (.TST_PAT, index = 0, ERR_FLG);  !READ MLCS1
8849 ;          5041
8850 ;          5042            [1] :
8851 ;          5043                RD_ER (.TST_PAT, index = 6, ERR_FLG);   !READ MLER
8852 ;          5044
8853 ;          5045            [2] :
8854 ;          5046                RD_DA (.TST_PAT, index = 3, ERR_FLG);   !READ MLDA
8855 ;          5047
8856 ;          5048            [3] :
8857 ;          5049                RD_PA (.TST_PAT, index = 8, ERR_FLG);   !READ MLPA
8858 ;          5050
8859 ;          5051            [4] :
8860 ;          5052                RD_E1 (.TST_PAT, index = 13, ERR_FLG);  !READ MLE1
8861 ;          5053
8862 ;          5054            [5] :
8863 ;          5055                RD_E2 (.TST_PAT, index = 14, ERR_FLG);  !READ MLE2
8864 ;          5056            tes;
8865 ;          5057
8866 ;          5058        if .ERR_FLG IS_SET                      !SEE IF READ FOUND AN ERROR
8867 ;          5059        then
8868 ;          5060            begin
8869 ;          5061
8870 ;          5062            selectone .CNT_2 of
8871 ;          5063                set
8872 ;          5064
8873 ;          5065                [0 to 2] :
8874 ;          5066                    ERRDF (110, ASYNC, DUMPER); !ASYNC MODULE FAILURE
8875 ;          5067
```

```
8877 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
8878 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (58)
8879
8880 ;          5068                [3 to 5] :
8881 ;          5069                    ERRDF (110, ARR_DAT, DUMPER);       !ARRAY DATA MODULE FAILURE
8882 ;          5070                tes;
8883 ;          5071
8884 ;          5072            PRINTB (THR_FMT, WRD_38, WRD_37, WRD_10);
8885 ;          5073            PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
8886 ;          5074            DODU_FLG = ONE;
8887 ;          5075            end;
8888 ;          5076
8889 ;          5077        end;
8890 ;          5078
8891 ;          5079    end;
8892 ;          5080
8893 ;          5081  ENDSUB;
8894 ;          5082
8895 ;          5083  if .DODU_FLG IS_SET                        !DROP THIS UNIT IF DODU_FLG IS_SET
8896 ;          5084  then
8897 ;          5085      begin
8898 ;          5086      DODU (.ML_LUN);
8899 ;          5087      DOCLN;
8900 ;          5088      end;
8901 ;          5089
8902 ;          5090  ENDTST;
8906
8907                                  .SBTTL  $T8
8911 031154  004167  152736          $T8:    JSR     R1,$SAVE5               ;                       4962
8912 031160  005746                          TST     -(SP)
8913 031162  104402                  1$:     TRAP    2                       ;                       4995
8914 031164  152777  000040  162022          BISB    #40,@ML.REG+40          ;                       4997
8915 031172  016703  162404                  MOV     ML.DUT,R3
8916 031176  042703  177770                  BIC     #177770,R3
8917 031202  142777  000007  162004          BICB    #7,@ML.REG+40
8918 031210  150377  162000                  BISB    R3,@ML.REG+40
8919 031214  005005                          CLR     R5                      ; DODU.FLG              4999
8920 031216  012704  125252                  MOV     #-52526,R4              ; *,TST.PAT             5000
8921 031222  010446                          MOV     R4,-(SP)                ; TST.PAT,*             5001
8922 031224  005046                          CLR     -(SP)
8923 031226  004767  166236                  JSR     PC,WRT.CS1
8924 031232  010416                          MOV     R4,(SP)                 ; TST.PAT,*             5002
8925 031234  012746  000006                  MOV     #6,-(SP)
8926 031240  004767  166402                  JSR     PC,WRT.ER
8927 031244  010416                          MOV     R4,(SP)                 ; TST.PAT,*             5003
8928 031246  012746  000003                  MOV     #3,-(SP)
8929 031252  004767  166546                  JSR     PC,WRT.DA
8930 031256  010416                          MOV     R4,(SP)                 ; TST.PAT,*             5004
8931 031260  012746  000010                  MOV     #10,-(SP)
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                
8936 031264  004767  167070                    JSR     PC,WRT.PA
8937 031270  010416                            MOV     R4,(SP)          ; TST.PAT,*                                5005
8938 031272  012746  000015                    MOV     #15,-(SP)
8939 031276  004767  167264                    JSR     PC,WRT.E1
8940 031302  010416                            MOV     R4,(SP)          ; TST.PAT,*                                5006
8941 031304  012746  000016                    MOV     #16,-(SP)
8942 031310  004767  167460                    JSR     PC,WRT.E2
8943 031314  005001                            CLR     R1               ; CNT.1                                    5008
8944 031316  005104                 2$:        COM     R4               ; TST.PAT                                  5010
8945 031320  010103                            MOV     R1,R3            ; CNT.1,*                                  5012
8946 031322  006303                            ASL     R3
8947 031324  066307  031330                    ADD     3$(R3),PC
8948 031330  000012                 3$:        .WORD   4$-3$
8949 031332  000024                            .WORD   5$-3$
8950 031334  000040                            .WORD   6$-3$
8951 031336  000054                            .WORD   7$-3$
8952 031340  000070                            .WORD   8$-3$
8953 031342  010446                 4$:        MOV     R4,-(SP)         ; TST.PAT,*                                5016
8954 031344  005046                            CLR     -(SP)
8955 031346  004767  166116                    JSR     PC,WRT.CS1
8956 031352  000427                            BR      9$               ;                                          5012
8957 031354  010446                 5$:        MOV     R4,-(SP)         ; TST.PAT,*                                5019
8958 031356  012746  000006                    MOV     #6,-(SP)
8959 031362  004767  166260                    JSR     PC,WRT.ER
8960 031366  000421                            BR      9$               ;                                          5012
8961 031370  010446                 6$:        MOV     R4,-(SP)         ; TST.PAT,*                                5022
8962 031372  012746  000003                    MOV     #3,-(SP)
8963 031376  004767  166422                    JSR     PC,WRT.DA
8964 031402  000413                            BR      9$               ;                                          5012
8965 031404  010446                 7$:        MOV     R4,-(SP)         ; TST.PAT,*                                5025
8966 031406  012746  000010                    MOV     #10,-(SP)
8967 031412  004767  166742                    JSR     PC,WRT.PA
8968 031416  000405                            BR      9$               ;                                          5012
8969 031420  010446                 8$:        MOV     R4,-(SP)         ; TST.PAT,*                                5028
8970 031422  012746  000015                    MOV     #15,-(SP)
8971 031426  004767  167134                    JSR     PC,WRT.E1
8972 031432  005104                 9$:        COM     R4               ; TST.PAT                                  5031
8973 031434  010103                            MOV     R1,R3            ; CNT.1,CNT.2                              5033
8974 031436  000576                            BR      22$
8975 031440  010300                 10$:       MOV     R3,R0            ; CNT.2,*                                  5036
8976 031442  006300                            ASL     R0
8977 031444  066007  031450                    ADD     11$(R0),PC
8978 031450  000014                 11$:       .WORD   12$-11$
8979 031452  000036                            .WORD   13$-11$
8980 031454  000062                            .WORD   14$-11$
8981 031456  000106                            .WORD   15$-11$
8982 031460  000132                            .WORD   16$-11$
8983 031462  000156                            .WORD   17$-11$
8984 031464  010446                 12$:       MOV     R4,-(SP)         ; TST.PAT,*                                5040
8985 031466  005002                            CLR     R2               ; INDEX
8986 031470  005046                            CLR     -(SP)
8987 031472  012746  000030                    MOV     #30,-(SP)
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                ADD     SP,(SP)                 ; ERR.FLG,*
                                                JSR     PC,RD.CS1
                                                BR      18$                     ;                                       5036
                                        13$:    MOV     R4,-(SP)                ; TST.PAT,*                             5043
                                                MOV     #6,R2                   ; *,INDEX
                                                MOV     R2,-(SP)                ; INDEX,*
                                                MOV     #30,-(SP)
                                                ADD     SP,(SP)                 ; ERR.FLG,*
                                                JSR     PC,RD.ER
                                                BR      18$                     ;                                       5036
                                        14$:    MOV     R4,-(SP)                ; TST.PAT,*                             5046
                                                MOV     #3,R2                   ; *,INDEX
                                                MOV     R2,-(SP)                ; INDEX,*
                                                MOV     #30,-(SP)
                                                ADD     SP,(SP)                 ; ERR.FLG,*
                                                JSR     PC,RD.DA
                                                BR      18$                     ;                                       5036
                                        15$:    MOV     R4,-(SP)                ; TST.PAT,*                             5049
                                                MOV     #10,R2                  ; *,INDEX
                                                MOV     R2,-(SP)                ; INDEX,*
                                                MOV     #30,-(SP)
                                                ADD     SP,(SP)                 ; ERR.FLG,*
                                                JSR     PC,RD.PA
                                                BR      18$                     ;                                       5036
                                        16$:    MOV     R4,-(SP)                ; TST.PAT,*                             5052
                                                MOV     #15,R2                  ; *,INDEX
                                                MOV     R2,-(SP)                ; INDEX,*
                                                MOV     #30,-(SP)
                                                ADD     SP,(SP)                 ; ERR.FLG,*
                                                JSR     PC,RD.E1
                                                BR      18$                     ;                                       5036
                                        17$:    MOV     R4,-(SP)                ; TST.PAT,*                             5055
                                                MOV     #16,R2                  ; *,INDEX
                                                MOV     R2,-(SP)                ; INDEX,*
                                                MOV     #30,-(SP)
                                                ADD     SP,(SP)                 ; ERR.FLG,*
                                                JSR     PC,RD.E2
                                18$:    CMP     30(SP),#1               ; ERR.FLG,*                             5058
                                                BNE     21$
                                                TST     R3                      ; CNT.2                                 5062
                                                BLT     19$
                                                CMP     R3,#2                   ; CNT.2,*
                                                BGT     19$
                                                TRAP    55                      ;                                       5066
                                                .WORD   156
                                                .WORD   ASYNC
                                                .WORD   DUMPER
                                                BR      20$                     ;                                       5062
                                19$:    CMP     R3,#3                   ; CNT.2,*
                                                BLT     20$
                                                CMP     R3,#5                   ; CNT.2,*
                                                BGT     20$
```

```
9045                                    ;ML4                                                    14-May-1981 13:48:54    TOPS
9046                                    ;                                                       14-May-1981 13:05:08    PA:<
9047
9048 031720  104455                            TRAP    55                      ;                                       5069
9049 031722  000156                            .WORD   156
9050 031724  010570                            .WORD   ARR.DAT
9051 031726  024060                            .WORD   DUMPER
9052 031730  012746  006406            20$:    MOV     #WRD.10,-(SP)           ;                                       5072
9053 031734  012746  006700                    MOV     #WRD.37,-(SP)
9054 031740  012746  006710                    MOV     #WRD.38,-(SP)
9055 031744  012746  006034                    MOV     #THR.FMT,-(SP)
9056 031750  012746  000004                    MOV     #4,-(SP)
9057 031754  010600                            MOV     SP,R0                   ; SP,*
9058 031756  104414                            TRAP    14
9059 031760  016716  161144                    MOV     RD.DATA,(SP)            ;                                       5073
9060 031764  016746  161136                    MOV     WT.DATA,-(SP)
9061 031770  010200                            MOV     R2,R0                   ; INDEX,*
9062 031772  006300                            ASL     R0
9063 031774  006300                            ASL     R0
9064 031776  006300                            ASL     R0
9065 032000  016046  013154                    MOV     ML.REG(R0),-(SP)
9066 032004  012746  005216                    MOV     #FMT.16,-(SP)
9067 032010  012746  000004                    MOV     #4,-(SP)
9068 032014  010600                            MOV     SP,R0                   ; SP,*
9069 032016  104414                            TRAP    14
9070 032020  012705  000001                    MOV     #1,R5                   ; *,DODU.FLG                            5074
9071 032024  062706  000022                    ADD     #22,SP                  ;                                       5060
9072 032030  062706  000006            21$:    ADD     #6,SP                   ;                                       5034
9073 032034  005203                    22$:    INC     R3                      ; CNT.2                                 5033
9074 032036  020327  000005                    CMP     R3,#5                   ; CNT.2,*
9075 032042  003002                            BGT     23$
9076 032044  000167  177370                    JMP     10$
9077 032050  022626                    23$:    CMP     (SP)+,(SP)+             ;                                       5009
9078 032052  005201                            INC     R1                      ; CNT.1                                 5008
9079 032054  020127  000004                    CMP     R1,#4                   ; CNT.1,*
9080 032060  003002                            BGT     24$
9081 032062  000167  177230                    JMP     2$
9082 032066  062706  000016            24$:    ADD     #16,SP                  ;                                       4995
9083 032072  104467                            TRAP    67                      ;                                       5079
9084 032074  006000                            ROR     R0
9085 032076  103002                            BHIS    25$
9086 032100  000167  177056                    JMP     1$
9087 032104  005305                    25$:    DEC     R5                      ; DODU.FLG                              5083
9088 032106  001004                            BNE     26$
9089 032110  016700  161464                    MOV     ML.LUN,R0               ;                                       5086
9090 032114  104451                            TRAP    51
9091 032116  104444                            TRAP    44
9092 032120  005726                    26$:    TST     (SP)+                   ;                                       4962
9093 032122  000207                            RTS     PC
9094
9095                                    ; Routine Size:  244 words
9096                                    ; Maximum stack depth per invocation:  28 words
```

```
 9105
 9106
 9110
 9111                                    .SBTTL  T8
 9115 032124                        T8::
 9116 032124  004767  177024        1$:     JSR     PC,$T8                          ;                5088
 9117 032130  104466                        TRAP    66
 9118 032132  006000                        ROR     R0
 9119 032134  103773                        BLO     1$
 9120 032136  000207                        RTS     PC
 9121
 9122                                    ; Routine Size:  6 words
 9123                                    ; Maximum stack depth per invocation:  0 words
 9128
 9129
 9130 ;          5091  !<BLF/PAGE>
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (59)

;          5092  !
;          5093  !
;          5094  BGNTST;
;          5095
;          5096  !++
;          5097  ! TEST NUMBER:  TST 9
;          5098  !
;          5099  ! TEST NAME:    PRINT SERIAL NUMBER
;          5100  !
;          5101  ! TEST DESCRIPTION:
;          5102  !       UPON A YES RESPONSE TO THE
;          5103  !       SOFTWARE QUESTION 'PRINT SERIAL NO?
;          5104  !       PRINT OUT THE DRIVE UNDER TEST
;          5105  !       SERIAL NUMBER.
;          5106  !
;          5107  !--
;          5108
;          5109  external
;          5110      PRSN;                                 !LOCATION WHERE ANSWER TO SW QUESTION IS STORED
;          5111
;          5112  local
;          5113      D3,                                   !STORES DIGIT 3 OF SERIAL NUMBER
;          5114      D2,                                   !STORES DIGIT 2 OF SERIAL NUMBER
;          5115      D1,                                   !STORES DIGIT 1 OF SERIAL NUMBER
;          5116      D0;                                   !STORES DIGIT 0 OF SERIAL NUMBER
;          5117
;          5118  if .PRSN IS_SET                          !SEE IF WE PRINT THE SERIAL NUMBER
;          5119  then
;          5120      begin                                 !PRINT THE SERIAL NUMBER IF THE REPLY WAS YES
;          5121      D3 = .SN3;                            !LOAD DIGIT 3 OF SN INTO D3
;          5122      D2 = .SN2;                            !LOAD DIGIT 2 OF SN INTO D2
;          5123      D1 = .SN1;                            !LOAD DIGIT 1 OF SN INTO D1
;          5124      D0 = .SN0;                            !LOAD DIGIT 0 OF SN INTO D0
;          5125
;          5126      if ((.D3 gtr 9) or (.D2 gtr 9) or (.D1 gtr 9) or (.D0 gtr 9))
;          5127                                            !SEE IF DIGITS ARE TO BIG FOR COVERSION
;          5128      then
;          5129          PRINTB (FMT_25, PHR_15, .MLSN)    !PRINT OCTAL SN IF TO BIG
;          5130      else
;          5131          PRINTB (FMT_26, PHR_15, .D3, .D2, .D1, .D0);    !ELSE PRINT DECIMAL SERIAL NUMBER
;          5132
;          5133      end;
;          5134
;          5135  ENDTST;
;
;                                .GLOBL  PRSN
;
;                                .SBTTL  $T9
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                        $T9:    JSR     R1,$SAVE3               ;                                       5090
                                                CMP     PRSN,#1                 ;                                       5118
                                                BNE     4$
                                                MOV     @ML.REG+140,R3          ; *,D3                                  5121
                                                ASR     R3                      ; D3
                                                ASR     R3                      ; D3
                                                ASR     R3                      ; D3
                                                ASR     R3                      ; D3
                                                SWAB    R3                      ; D3
                                                BIC     #177760,R3              ; *,D3
                                                MOV     @ML.REG+140,R0          ; *,D2                                  5122
                                                SWAB    R0                      ; D2
                                                BIC     #177760,R0              ; *,D2
                                                MOVB    @ML.REG+140,R1          ; *,D1                                  5123
                                                ASR     R1                      ; D1
                                                ASR     R1                      ; D1
                                                ASR     R1                      ; D1
                                                ASR     R1                      ; D1
                                                BIC     #177760,R1              ; *,D1
                                                MOVB    @ML.REG+140,R2          ; *,D0                                  5124
                                                BIC     #177760,R2              ; *,D0
                                                CMP     R3,#11                  ; D3,*                                  5126
                                                BGT     1$
                                                CMP     R0,#11                  ; D2,*
                                                BGT     1$
                                                CMP     R1,#11                  ; D1,*
                                                BGT     1$
                                                CMP     R2,#11                  ; D0,*
                                                BLE     2$
                                        1$:     MOV     @ML.REG+140,-(SP)       ;                                       5129
                                                MOV     #PHR.15,-(SP)
                                                MOV     #FMT.25,-(SP)
                                                MOV     #3,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                BR      3$                      ;                                       5126
                                        2$:     MOV     R2,-(SP)                ; D0,*                                  5131
                                                MOV     R1,-(SP)                ; D1,*
                                                MOV     R0,-(SP)                ; D2,*
                                                MOV     R3,-(SP)                ; D3,*
                                                MOV     #PHR.15,-(SP)
                                                MOV     #FMT.26,-(SP)
                                                MOV     #6,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                ADD     #6,SP
                                        3$:     ADD     #10,SP                  ;                                       5120
                                        4$:     RTS     PC                      ;                                       5090
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<

                                ; Routine Size:  72 words
                                ; Maximum stack depth per invocation:  11 words


                                        .SBTTL  T9
032360                          T9::
032360  004767  177554          1$:     JSR     PC,$T9                          ;       5133
032364  104466                          TRAP    66
032366  006000                          ROR     R0
032370  103773                          BLO     1$
032372  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


;       5136  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (60)

```
9280 ;ML4
9281 ;
9282
9283 ;          5137  !
9284 ;          5138  !
9285 ;          5139  BGNTST;
9286 ;          5140
9287 ;          5141  !++
9288 ;          5142  ! TEST NUMBER:  TST 10
9289 ;          5143  !
9290 ;          5144  ! TEST NAME:    C-BUS PARITY TEST
9291 ;          5145  !
9292 ;          5146  ! TEST DESCRIPTION:
9293 ;          5147  !       TEST THE CONTROL BUS PARITY
9294 ;          5148  !       DETECTION AND GENERATING BY:
9295 ;          5149  !
9296 ;          5150  !       1.  WRITING BAD PARITY TO DEVICE
9297 ;          5151  !           AND TEST CPAR SET.
9298 ;          5152  !
9299 ;          5153  !       2.  WRITING GOOD PARITY TO DEVICE
9300 ;          5154  !           AND TEST CPAR CLR.
9301 ;          5155  !
9302 ;          5156  !       3.  READING DEVICE AND TEST GOOD
9303 ;          5157  !           PARITY GENERATION BY READING
9304 ;          5158  !           MCPE CLR.
9305 ;          5159  !
9306 ;          5160  !--
9307 ;          5161
9308 ;          5162  local
9309 ;          5163      SAVE,                          !TEMPORARY SAVE LOCATION
9310 ;          5164      TST_PAT;                       !TEST PATTERN
9311 ;          5165
9312 ;          5166  if .PAR_DIS IS_NOT_SET             !SEE IF PARITY IS DISABLED
9313 ;          5167  then
9314 ;          5168      begin                          !BEGIN IF PARITY IS ENABLE
9315 ;          5169      TST_PAT = %o'125252';          !ALTERNATING 1, 0 PATTERN
9316 ;          5170
9317 ;          5171      incr TWICE from 1 to 2 do      !REPEAT LOOP TWICE
9318 ;          5172          begin
9319 ;          5173          CLR_MBUS;
9320 ;          5174          PAT = ONE;                 !GENERATE EVEN PARITY BY SETTING THE PAT BIT
9321 ;          5175          MLDA = .TST_PAT;           !WRITE BAD PARITY ON CONTROL BUS
9322 ;          5176
9323 ;          5177          if .CPAR IS_NOT_SET        !READ CPAR BIT SET
9324 ;          5178          then
9325 ;          5179              begin
9326 ;          5180              ERRDF (7, ASYNC, DUMPER);      !ERROR IF NOT SET
9327 ;          5181              PRINTB (THR_FMT, WRD_5, WRD_7, WRD_9);
9328 ;          5182              end;
9329 ;          5183
9330 ;          5184          CLR_MBUS;                  !CLEAR OUT PAT BIT
9331 ;          5185          MLDA = .TST_PAT;           !WRITE ODD PARITY CONTROL BUS
9332 ;          5186
9333 ;          5187          if .CPAR IS_SET            !READ CPAR BIT CLEARED
9334 ;          5188          then
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (60)

;          5189            begin
;          5190            ERRDF (8, ASYNC, DUMPER);               !ERROR IF SET
;          5191            PRINTB (THR_FMT, WRD_6, WRD_7, WRD_9);
;          5192            end;
;          5193
;          5194        CLR_MBUS;
;          5195        SAVE = .MLDA;                               !READ A REGISTER FROM DUT
;          5196
;          5197        if .MCPE IS_SET                             !SEE IF GENERATED GOOD PARITY
;          5198        then
;          5199            begin
;          5200            ERRDF (9, ASYNC, DUMPER);               !ERROR IF MCPE IS_SET
;          5201            PRINTB (THR_FMT, WRD_6, WRD_7, WRD_8);
;          5202            end;
;          5203
;          5204        TST_PAT = .TST_PAT^ONE;                     !REPEAT WITH SHIFTED DATA
;          5205        end;
;          5206
;          5207    end
;          5208 else
;          5209    PRINTB (TWO_FMT, WRD_7, WRD_53);                !JUST PRINT MESSAGE IF PARITY IS DISABLED
;          5210
;          5211 ENDTST;

                                .SBTTL  $T10
032374 004167 151460        $T10:   JSR     R1,$SAVE3               ;                       5135
032400 005767 157162                TST     PAR.DIS                 ;                       5166
032404 001171                       BNE     5$
032406 012701 125252                MOV     #-52526,R1              ; *,TST.PAT             5169
032412 012702 000001                MOV     #1,R2                   ; *,TWICE               5171
032416 152777 000040 160570 1$:     BISB    #40,@ML.REG+40          ;                       5172
032424 016700 161152                MOV     ML.DUT,R0
032430 042700 177770                BIC     #177770,R0
032434 142777 000007 160552         BICB    #7,@ML.REG+40
032442 150077 160546                BISB    R0,@ML.REG+40
032446 152777 000020 160540         BISB    #20,@ML.REG+40          ;                       5174
032454 010177 160524                MOV     R1,@ML.REG+30           ; TST.PAT,*             5175
032460 132777 000010 160546         BITB    #10,@ML.REG+60          ;                       5177
032466 001022                       BNE     2$
032470 104455                       TRAP    55                      ;                       5180
032472 000007                       .WORD   7
032474 010464                       .WORD   ASYNC
032476 024060                       .WORD   DUMPER
032500 012746 006374                MOV     #WRD.9,-(SP)            ;                       5181
032504 012746 006344                MOV     #WRD.7,-(SP)
032510 012746 006330                MOV     #WRD.5,-(SP)
```

```
                                                                                                14-May-1981 13:48:54    TOPS
                                                                                                14-May-1981 13:05:08    PA:<
 9392                           ;ML4
 9393                           ;
 9394
 9395 032514  012746  006034                MOV     #THR.FMT,-(SP)
 9396 032520  012746  000004                MOV     #4,-(SP)
 9397 032524  010600                        MOV     SP,R0                           ; SP,*
 9398 032526  104414                        TRAP    14
 9399 032530  062706  000012                ADD     #12,SP                          ;                               5179
 9400 032534  152777  000040  160452  2$:   BISB    #40,@ML.REG+40                  ;                               5182
 9401 032542  016700  161034                MOV     ML.DUT,R0
 9402 032546  042700  177770                BIC     #177770,R0
 9403 032552  142777  000007  160434        BICB    #7,@ML.REG+40
 9404 032560  150077  160430                BISB    R0,@ML.REG+40
 9405 032564  010177  160414                MOV     R1,@ML.REG+30                   ; TST.PAT,*                     5185
 9406 032570  132777  000010  160436        BITB    #10,@ML.REG+60                  ;                               5187
 9407 032576  001422                        BEQ     3$
 9408 032600  104455                        TRAP    55                              ;                               5190
 9409 032602  000010                        .WORD   10
 9410 032604  010464                        .WORD   ASYNC
 9411 032606  024060                        .WORD   DUMPER
 9412 032610  012746  006374                MOV     #WRD.9,-(SP)                    ;                               5191
 9413 032614  012746  006344                MOV     #WRD.7,-(SP)
 9414 032620  012746  006336                MOV     #WRD.6,-(SP)
 9415 032624  012746  006034                MOV     #THR.FMT,-(SP)
 9416 032630  012746  000004                MOV     #4,-(SP)
 9417 032634  010600                        MOV     SP,R0                           ; SP,*
 9418 032636  104414                        TRAP    14
 9419 032640  062706  000012                ADD     #12,SP                          ;                               5189
 9420 032644  152777  000040  160342  3$:   BISB    #40,@ML.REG+40                  ;                               5192
 9421 032652  016700  160724                MOV     ML.DUT,R0
 9422 032656  042700  177770                BIC     #177770,R0
 9423 032662  142777  000007  160324        BICB    #7,@ML.REG+40
 9424 032670  150077  160320                BISB    R0,@ML.REG+40
 9425 032674  017703  160304                MOV     @ML.REG+30,R3                   ; *,SAVE                        5195
 9426 032700  032777  020000  160246        BIT     #20000,@ML.REG                  ;                               5197
 9427 032706  001422                        BEQ     4$
 9428 032710  104455                        TRAP    55                              ;                               5200
 9429 032712  000011                        .WORD   11
 9430 032714  010464                        .WORD   ASYNC
 9431 032716  024060                        .WORD   DUMPER
 9432 032720  012746  006360                MOV     #WRD.8,-(SP)                    ;                               5201
 9433 032724  012746  006344                MOV     #WRD.7,-(SP)
 9434 032730  012746  006336                MOV     #WRD.6,-(SP)
 9435 032734  012746  006034                MOV     #THR.FMT,-(SP)
 9436 032740  012746  000004                MOV     #4,-(SP)
 9437 032744  010600                        MOV     SP,R0                           ; SP,*
 9438 032746  104414                        TRAP    14
 9439 032750  062706  000012                ADD     #12,SP                          ;                               5199
 9440 032754  006301                4$:     ASL     R1                              ; TST.PAT                       5204
 9441 032756  005202                        INC     R2                              ; TWICE                         5171
 9442 032760  020227  000002                CMP     R2,#2                           ; TWICE,*
 9443 032764  003614                        BLE     1$
 9444 032766  000207                        RTS     PC                              ;                               5166
 9445 032770  012746  007074        5$:     MOV     #WRD.53,-(SP)                   ;                               5209
 9446 032774  012746  006344                MOV     #WRD.7,-(SP)
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<

033000  012746  006024                        MOV     #TWO.FMT,-(SP)
033004  012746  000003                        MOV     #3,-(SP)
033010  010600                                MOV     SP,R0                           ; SP,*
033012  104414                                TRAP    14
033014  062706  000010                        ADD     #10,SP
033020  000207                                RTS     PC                              ;                       5135

                                        ; Routine Size:  139 words
                                        ; Maximum stack depth per invocation:  9 words


                                                .SBTTL  T10
033022                                  T10::
033022  004767  177346                  1$:     JSR     PC,$T10                         ;                       5209
033026  104466                                TRAP    66
033030  006000                                ROR     R0
033032  103773                                BLO     1$
033034  000207                                RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words

;               5212    !<BLF/PAGE>
```

```
9491 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
9492 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (61)
9493
9494 ;          5213  !
9495 ;          5214  !
9496 ;          5215  BGNTST;
9497 ;          5216
9498 ;          5217  !++
9499 ;          5218  ! TEST NUMBER:  TST 11
9500 ;          5219  !
9501 ;          5220  ! TEST NAME:    MEMORY SIZING TEST
9502 ;          5221  !
9503 ;          5222  ! TEST DESCRIPTION:
9504 ;          5223  !
9505 ;          5224  !       THIS TESTS THE ML11'S SIZING
9506 ;          5225  !       LOGIC BY COMPARING THE
9507 ;          5226  !       OPERATORS INPUTED NUMBER OF ARRAYS
9508 ;          5227  !       PRESENT TO THE ML11 SIZING
9509 ;          5228  !       NUMBER OF ARRAYS PRESENT
9510 ;          5229  !       THE DRIVE IS DROPPED ON DETECTED ERRORS.
9511 ;          5230  ! IMPLICIT INPUTS:
9512 ;          5231  !
9513 ;          5232  !       OP_NUM_ARR:
9514 ;          5233  !       LOADED DURING INIT CODE AND
9515 ;          5234  !       STORES OPERATORS INPUT TO THE
9516 ;          5235  !       SOFTWARE QUESTION:
9517 ;          5236  !       NUMBER OF ARRAYS PRESENT?
9518 ;          5237  !
9519 ;          5238  !
9520 ;          5239  !--
9521 ;          5240
9522 ;          5241  local
9523 ;          5242      DODU_FLG;                              !DROP UNIT FLAG
9524 ;          5243
9525 ;          5244  BGNSUB;
9526 ;          5245  CLR_MBUS;
9527 ;          5246  DODU_FLG = ZERO;
9528 ;          5247
9529 ;          5248  if (.OP_NUM_ARR + 1) neq .ML_NUM_ARR       !SEE IF DRIVE SIZED SAME NO. OF ARRAYS AS OP INPUTED
9530 ;          5249  then
9531 ;          5250      begin
9532 ;          5251      ERRDF (10, ASYNC, DUMPER);             !IF NOT EQL THEN ERROR AND SET DODU_FLG
9533 ;          5252      PRINTB (TWO_FMT, FNC_1, WRD_14);
9534 ;          5253      PRINTB (FMT_2, (.OP_NUM_ARR + 1), .ML_NUM_ARR);
9535 ;          5254      DODU_FLG = ONE;
9536 ;          5255      end;
9537 ;          5256
9538 ;          5257  ENDSUB;
9539 ;          5258
9540 ;          5259  if .DODU_FLG IS_SET                        !DROP THIS UNIT IF DODU_FLG IS_SET
9541 ;          5260  then
9542 ;          5261      begin
9543 ;          5262      DODU (.ML_LUN);
9544 ;          5263      DOCLN;
9545 ;          5264      end;
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (61)

 9547 ;ML4
 9548 ;
 9549
 9550 ;          5265
 9551 ;          5266  ENDTST;
 9555
 9556                                        .SBTTL  $T11
 9560 033036  004167  151016          $T11:  JSR     R1,$SAVE3                    ;                              5211
 9561 033042  104402                 1$:    TRAP    2                            ;                              5242
 9562 033044  152777  000040  160142        BISB    #40,@ML.REG+40               ;                              5244
 9563 033052  016701  160524                MOV     ML.DUT,R1
 9564 033056  042701  177770                BIC     #177770,R1
 9565 033062  142777  000007  160124        BICB    #7,@ML.REG+40
 9566 033070  150177  160120                BISB    R1,@ML.REG+40
 9567 033074  005002                        CLR     R2                           ; DODU.FLG                     5246
 9568 033076  016701  156456                MOV     OP.NUM.ARR,R1                ;                              5248
 9569 033102  005201                        INC     R1
 9570 033104  017703  160164                MOV     @ML.REG+120,R3
 9571 033110  006203                        ASR     R3
 9572 033112  006203                        ASR     R3
 9573 033114  006203                        ASR     R3
 9574 033116  000303                        SWAB    R3
 9575 033120  042703  177740                BIC     #177740,R3
 9576 033124  010100                        MOV     R1,R0
 9577 033126  020003                        CMP     R0,R3
 9578 033130  001444                        BEQ     2$
 9579 033132  104455                        TRAP    55                           ;                              5251
 9580 033134  000012                        .WORD   12
 9581 033136  010464                        .WORD   ASYNC
 9582 033140  024060                        .WORD   DUMPER
 9583 033142  012746  006442                MOV     #WRD.14,-(SP)                ;                              5252
 9584 033146  012746  007726                MOV     #FNC.1,-(SP)
 9585 033152  012746  006024                MOV     #TWO.FMT,-(SP)
 9586 033156  012746  000003                MOV     #3,-(SP)
 9587 033162  010600                        MOV     SP,R0                        ; SP,*
 9588 033164  104414                        TRAP    14
 9589 033166  017703  160102                MOV     @ML.REG+120,R3               ;                              5253
 9590 033172  006203                        ASR     R3
 9591 033174  006203                        ASR     R3
 9592 033176  006203                        ASR     R3
 9593 033200  000303                        SWAB    R3
 9594 033202  042703  177740                BIC     #177740,R3
 9595 033206  010316                        MOV     R3,(SP)
 9596 033210  016746  156344                MOV     OP.NUM.ARR,-(SP)
 9597 033214  005216                        INC     (SP)
 9598 033216  012746  004266                MOV     #FMT.2,-(SP)
 9599 033222  012746  000003                MOV     #3,-(SP)
 9600 033226  010600                        MOV     SP,R0                        ; SP,*
 9601 033230  104414                        TRAP    14
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                
033232  012702  000001                MOV     #1,R2                   ; *,DODU.FLG                            5254
033236  062706  000016                ADD     #16,SP                  ;                                       5250
033242  104467                2$:     TRAP    67                      ;                                       5255
033244  006000                        ROR     R0
033246  103675                        BLO     1$
033250  005302                        DEC     R2                      ; DODU.FLG                              5259
033252  001004                        BNE     3$
033254  016700  160320                MOV     ML.LUN,R0               ;                                       5262
033260  104451                        TRAP    51
033262  104444                        TRAP    44
033264  000207                3$:     RTS     PC                      ;                                       5211
                                
                                ; Routine Size:  76 words
                                ; Maximum stack depth per invocation:  11 words
                                
                                
                                
                                        .SBTTL  T11
033266                          T11::
033266  004767  177544          1$:     JSR     PC,$T11                 ;                                       5264
033272  104466                        TRAP    66
033274  006000                        ROR     R0
033276  103773                        BLO     1$
033300  000207                        RTS     PC
                                
                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words
                                
                                
;               5267  !<BLF/PAGE>
```

```
9651 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
9652 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (62)
9653
9654 ;          5268  !
9655 ;          5269  !
9656 ;          5270  BGNTST;
9657 ;          5271
9658 ;          5272  !++
9659 ;          5273  ! TEST NUMBER:  TST 12
9660 ;          5274  !
9661 ;          5275  ! TEST NAME:    NO-OP FUNCTION TEST
9662 ;          5276  !
9663 ;          5277  ! TEST DESCRIPTION:
9664 ;          5278  !
9665 ;          5279  !       TEST IF THE DRIVE CAN PERFORM
9666 ;          5280  !       A NO_OP FUNCTION WITH OUT
9667 ;          5281  !       HANGING THE DRIVE.
9668 ;          5282  !
9669 ;          5283  !       A NO_OP FUNCTION IS WRITTEN
9670 ;          5284  !       INTO MLCS1.
9671 ;          5285  !       THEN GO AND ERROR BITS ARE
9672 ;          5286  !       CHECKED FOR CORRECT STATES.
9673 ;          5287  !
9674 ;          5288  !       THIS UNIT IS DROPPED ON DETECTED
9675 ;          5289  !       ERRORS.
9676 ;          5290  !
9677 ;          5291  ! IMPLICIT INPUTS:      NONE
9678 ;          5292  !
9679 ;          5293  !
9680 ;          5294  !--
9681 ;          5295
9682 ;          5296  local
9683 ;          5297      DODU_FLG;                                  !DROP UNIT FLAG
9684 ;          5298
9685 ;          5299  BGNSUB;
9686 ;          5300  CLR_MBUS;
9687 ;          5301  DODU_FLG = ZERO;
9688 ;          5302  MLCST = NOOP;                                  !DO A NOOP FUNCTION
9689 ;          5303  DELAY (ONE_US);                                !DELAY 1 US
9690 ;          5304
9691 ;          5305  if .GO IS_SET                                  !SEE IF GO STILL SET
9692 ;          5306  then
9693 ;          5307      begin
9694 ;          5308      ERRDF (11, ASYNC, DUMPER);                 !ERROR AND SET DODU_FLG IF STILL SET
9695 ;          5309      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_2, WRD_19);
9696 ;          5310      DODU_FLG = ONE;
9697 ;          5311      end;
9698 ;          5312
9699 ;          5313  if .ILF IS_SET                                 !SEE ILF SET
9700 ;          5314  then
9701 ;          5315      begin
9702 ;          5316      ERRDF (12, ASYNC, DUMPER);                 !ERROR AND SET DODU_FLG IF SET
9703 ;          5317      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_2, WRD_19);
9704 ;          5318      end;
9705 ;          5319
```

```
 9707 ;ML4                                                          14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 9708 ;                                                             14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (62)
 9709
 9710 ;          5320  if .OPI IS_SET                               !SEE IF CPI SET
 9711 ;          5321  then
 9712 ;          5322      begin
 9713 ;          5323      ERRDF (13, ASYNC, DUMPER);               !ERROR AND SET DODU_FLG IF SET
 9714 ;          5324      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_11, FNC_2, WRD_19);
 9715 ;          5325      end;
 9716 ;          5326
 9717 ;          5327  ENDSUB;
 9718 ;          5328
 9719 ;          5329  if .DODU_FLG IS_SET                          !DROP THIS UNIT IF DODU_FLG IS_SET
 9720 ;          5330  then
 9721 ;          5331      begin
 9722 ;          5332      DODU (.ML_LUN);
 9723 ;          5333      DOCLN;
 9724 ;          5334      end;
 9725 ;          5335
 9726 ;          5336  ENDTST;
 9730
 9731                                        .SBTTL  $T12
 9735 033302  004167  150536          $T12:  JSR     R1,$SAVE2                    ;                          5266
 9736 033306  005746                        TST     -(SP)
 9737 033310  104402                  1$:   TRAP    2                            ;                          5297
 9738 033312  152777  000040  157674        BISB    #40,@ML.REG+40               ;                          5299
 9739 033320  016701  160256              MOV     ML.DUT,R1
 9740 033324  042701  177770              BIC     #177770,R1
 9741 033330  142777  000007  157656        BICB    #7,@ML.REG+40
 9742 033336  150177  157652              BISB    R1,@ML.REG+40
 9743 033342  005002                        CLR     R2                           ; DODU.FLG                 5301
 9744 033344  012777  000001  157602        MOV     #1,@ML.REG                   ;                          5302
 9745 033352  012700  000001              MOV     #1,R0                        ; *,$$TMP2                 5303
 9746 033356  001410                  2$:   BEQ     5$
 9747 033360  016701  146532              MOV     L$DLY,R1                     ; *,$$TMP1
 9748 033364  001403                        BEQ     4$
 9749 033366  005016                  3$:   CLR     (SP)                         ; $$TMP
 9750 033370  005301                        DEC     R1                           ; $$TMP1
 9751 033372  001375                        BNE     3$
 9752 033374  005300                  4$:   DEC     R0                           ; $$TMP2
 9753 033376  000767                        BR      2$
 9754 033400  132777  000001  157546  5$:   BITB    #1,@ML.REG                   ;                          5305
 9755 033406  001430                        BEQ     6$
 9756 033410  104455                        TRAP    55                           ;                          5308
 9757 033412  000013                        .WORD   13
 9758 033414  010464                        .WORD   ASYNC
 9759 033416  024060                        .WORD   DUMPER
 9760 033420  012746  006506              MOV     #WRD.19,-(SP)                ;                          5309
 9761 033424  012746  007742              MOV     #FNC.2,-(SP)
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                
033430  012746  006416                          MOV     #WRD.11,-(SP)
033434  012746  007404                          MOV     #PHR.2,-(SP)
033440  012746  006276                          MOV     #WRD.1,-(SP)
033444  012746  006062                          MOV     #FIV.FMT,-(SP)
033450  012746  000006                          MOV     #6,-(SP)
033454  010600                                  MOV     SP,R0                           ; SP,*
033456  104414                                  TRAP    14
033460  012702  000001                          MOV     #1,R2                           ; *,DODU.FLG                    5310
033464  062706  000016                          ADD     #16,SP                          ;                               5307
033470  132777  000001  157536  6$:             BITB    #1,@ML.REG+60                   ;                               5313
033476  001426                                  BEQ     7$
033500  104455                                  TRAP    55                              ;                               5316
033502  000014                                  .WORD   14
033504  010464                                  .WORD   ASYNC
033506  024060                                  .WORD   DUMPER
033510  012746  006506                          MOV     #WRD.19,-(SP)                   ;                               5317
033514  012746  007742                          MOV     #FNC.2,-(SP)
033520  012746  006416                          MOV     #WRD.11,-(SP)
033524  012746  007472                          MOV     #PHR.5,-(SP)
033530  012746  006314                          MOV     #WRD.3,-(SP)
033534  012746  006062                          MOV     #FIV.FMT,-(SP)
033540  012746  000006                          MOV     #6,-(SP)
033544  010600                                  MOV     SP,R0                           ; SP,*
033546  104414                                  TRAP    14
033550  062706  000016                          ADD     #16,SP                          ;                               5315
033554  032777  020000  157452  7$:             BIT     #20000,@ML.REG+60               ;                               5320
033562  001426                                  BEQ     8$
033564  104455                                  TRAP    55                              ;                               5323
033566  000015                                  .WORD   15
033570  010464                                  .WORD   ASYNC
033572  024060                                  .WORD   DUMPER
033574  012746  006506                          MOV     #WRD.19,-(SP)                   ;                               5324
033600  012746  007742                          MOV     #FNC.2,-(SP)
033604  012746  006416                          MOV     #WRD.11,-(SP)
033610  012746  007472                          MOV     #PHR.5,-(SP)
033614  012746  006322                          MOV     #WRD.4,-(SP)
033620  012746  006062                          MOV     #FIV.FMT,-(SP)
033624  012746  000006                          MOV     #6,-(SP)
033630  010600                                  MOV     SP,R0                           ; SP,*
033632  104414                                  TRAP    14
033634  062706  000016                          ADD     #16,SP                          ;                               5322
033640  104467                          8$:     TRAP    67                              ;                               5325
033642  006000                                  ROR     R0
033644  103621                                  BLO     1$
033646  005302                                  DEC     R2                              ; DODU.FLG                      5329
033650  001004                                  BNE     9$
033652  016700  157722                          MOV     ML.LUN,R0                       ;                               5332
033656  104451                                  TRAP    51
033660  104444                                  TRAP    44
033662  005726                          9$:     TST     (SP)+                           ;                               5266
033664  000207                                  RTS     PC
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                        ; Routine Size:  122 words
                                        ; Maximum stack depth per invocation:  11 words
                                                .SBTTL  T12
033666                                  T12::
033666  004767  177410                  1$:     JSR     PC,$T12                 ;               5334
033672  104466                                  TRAP    66
033674  006000                                  ROR     R0
033676  103773                                  BLO     1$
033700  000207                                  RTS     PC
                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
;       5337    !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (63)

```
;ML4
;
;          5338  !
;          5339  !
;          5340  BGNTST;
;          5341
;          5342  !++
;          5343  ! TEST NUMBER:  TST 13
;          5344  !
;          5345  ! TEST NAME:    WRITE CHECK FUNCTION TEST
;          5346  !
;          5347  ! TEST DESCRIPTION:
;          5348  !
;          5349  !       TEST IF THE DRIVE CAN PERFORM
;          5350  !       A WRITE CHECK FUNCTION WITHOUT
;          5351  !       HANGING THE DRIVE.
;          5352  !
;          5353  !       A WRITE CHECK FUNCTION IS WRITTEN
;          5354  !       INTO MLCS1.
;          5355  !       THEN GO AND ERROR BITS ARE
;          5356  !       CHECKED FOR CORRECT STATES
;          5357  !
;          5358  !--
;          5359
;          5360  local
;          5361      DODU_FLG;                                   !DROP UNIT FLAG
;          5362
;          5363  BGNSUB;
;          5364  CLR_MBUS;
;          5365  DODU_FLG = ZERO;
;          5366  FIRST_BLK_XFER ();                              !SET UP A FIRST BLK XFERR
;          5367  MLCS1 = WRT_CHK;                                !DO A WRITE CHECK FUNCTION
;          5368
;          5369  if .GO IS_NOT_SET                             !SEE IF THE GO BIT GOT SET
;          5370  then
;          5371      begin
;          5372      ERRDF (14, ASYNC, DUMPER);                  !ERROR IF NOT SET
;          5373      PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_4, WRD_19);
;          5374
;          5375      if .DRY IS_NOT_SET                          !SEE IF THE DRY IS SET WHILE GO IS CLEARED
;          5376      then
;          5377          begin
;          5378          ERRDF (15, ASYNC, DUMPER);              !ERROR IF CLEARED
;          5379          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
;          5380          end;
;          5381
;          5382      DODU_FLG = ONE;                             !SET DODU_FLG
;          5383      end
;          5384  else
;          5385
;          5386      if .DRY IS_SET                              !THE GO IS SET SO SEE IF DRY IS CLEARED
;          5387      then
;          5388          begin
;          5389          ERRDF (16, ASYNC, DUMPER);              !ERROR IF DRY IS SET
```

```
9911 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
9912 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (63)
9913
9914 ;          5390          PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_5);
9915 ;          5391          DODU_FLG = ONE;
9916 ;          5392          end;
9917 ;          5393
9918 ;          5394    if .ILF IS_SET                                  !SEE IF ILF IS SET
9919 ;          5395    then
9920 ;          5396        begin
9921 ;          5397        ERRDF (17, ASYNC, DUMPER);                  !ERROR IF SET
9922 ;          5398        PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_4, WRD_19);
9923 ;          5399        end;
9924 ;          5400
9925 ;          5401    if .OPI IS_SET                                  !SEE IF OPI IS SET
9926 ;          5402    then
9927 ;          5403        begin
9928 ;          5404        ERRDF (18, ASYNC, DUMPER);                  !ERROR IF SET
9929 ;          5405        PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_4, WRD_19);
9930 ;          5406        end;
9931 ;          5407
9932 ;          5408    DELAY (FRTY_US);                                !WAIT FO XFERR TO COMPLTE
9933 ;          5409
9934 ;          5410    if .DRY IS_NOT_SET                              !SEE IF DRY IS SETS AFTER XFERR
9935 ;          5411    then
9936 ;          5412        begin
9937 ;          5413
9938 ;          5414        if .GO IS_SET                               !IF DRY IS NOT SET THEN SEE IF GO IS SET
9939 ;          5415        then
9940 ;          5416            begin
9941 ;          5417            CLR_MBUS;                               !IF THE GO IS SET THEN TRY TO CLR GO
9942 ;          5418
9943 ;          5419            if .GO IS_SET then ERRDF (19, ASYNC, DUMPER) else ERRDF (20, SYNC, DUMPER);
9944 ;          5420
9945 ;          5421                                                    !IF GO IS STILL SET THEN ASYNC FAILURE
9946 ;          5422            PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_4, WRD_19);  !ELSE SYNC MODLE FAILURE
9947 ;          5423            end
9948 ;          5424        else
9949 ;          5425            begin
9950 ;          5426            ERRDF (21, ASYNC, DUMPER);              !ERROR GO AND DRY BOTH CLEARED
9951 ;          5427            PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_4, WRD_19);
9952 ;          5428            end;
9953 ;          5429
9954 ;          5430        DODU_FLG = ONE;                             !SET THE DODU_FLG
9955 ;          5431        end;
9956 ;          5432
9957 ;          5433    if .GO IS_SET                                   !SEE IF THE GO IS STILL SET
9958 ;          5434    then
9959 ;          5435        begin
9960 ;          5436        CLR_MBUS;                                   !TRY TO CLR GO IF STILL SET
9961 ;          5437
9962 ;          5438        if .GO IS_SET then ERRDF (22, ASYNC, DUMPER) else ERRDF (23, SYNC, DUMPER);
9963 ;          5439
9964 ;          5440                                                    !IF GO IS STILL SET THE ASYNC FAILURE
9965 ;          5441        PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_4, WRD_19);      !ELSE SYNC MODULE FAILURE
```

```
 9967 :ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 9968 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (63)
 9969
 9970 ;          5442      DODU_FLG = ONE;
 9971 ;          5443      end;
 9972 ;          5444
 9973 ;          5445  ENDSUB;
 9974 ;          5446
 9975 ;          5447  if .DODU_FLG IS_SET                    !DROP THIS UNIT IF DODU_FLG IS_SET
 9976 ;          5448  then
 9977 ;          5449      begin
 9978 ;          5450      DODU (.ML_LUN);
 9979 ;          5451      DOCLN;
 9980 ;          5452      end;
 9981 ;          5453
 9982 ;          5454  ENDTST;
 9986
 9987                                          .SBTTL  $T13
 9991 033702  004167  150136          $T13:   JSR     R1,$SAVE2                       ;                       5336
 9992 033706  005746                          TST     -(SP)
 9993 033710  104402                  1$:     TRAP    2                               ;                       5361
 9994 033712  152777  000040  157274          BISB    #40,@ML.REG+40                  ;                       5363
 9995 033720  016701  157656                  MOV     ML.DUT,R1
 9996 033724  042701  177770                  BIC     #177770,R1
 9997 033730  142777  000007  157256          BICB    #7,@ML.REG+40
 9998 033736  150177  157252                  BISB    R1,@ML.REG+40
 9999 033742  005002                          CLR     R2                              ; DODU.FLG              5365
10000 033744  004767  162070                  JSR     PC,FIRST.BLK.XFER               ;                       5366
10001 033750  012777  000051  157176          MOV     #51,@ML.REG                     ;                       5367
10002 033756  132777  000001  157170          BITB    #1,@ML.REG                      ;                       5369
10003 033764  001057                          BNE     2$
10004 033766  104455                          TRAP    55                              ;                       5372
10005 033770  000016                          .WORD   16
10006 033772  010464                          .WORD   ASYNC
10007 033774  024060                          .WORD   DUMPER
10008 033776  012746  006506                  MOV     #WRD.19,-(SP)                   ;                       5373
10009 034002  012746  007756                  MOV     #FNC.4,-(SP)
10010 034006  012746  006426                  MOV     #WRD.12,-(SP)
10011 034012  012746  007366                  MOV     #PHR.1,-(SP)
10012 034016  012746  006276                  MOV     #WRD.1,-(SP)
10013 034022  012746  006062                  MOV     #FIV.FMT,-(SP)
10014 034026  012746  000006                  MOV     #6,-(SP)
10015 034032  010600                          MOV     SP,R0                           ; SP,*
10016 034034  104414                          TRAP    14
10017 034036  132777  000200  157160          BITB    #200,@ML.REG+50                 ;                       5375
10018 034044  001056                          BNE     3$
10019 034046  104455                          TRAP    55                              ;                       5378
10020 034050  000017                          .WORD   17
10021 034052  010464                          .WORD   ASYNC
```

```
10023                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
10024                                   ;                                                       14-May-1981 13:05:08    PA:<
10025
10026 034054  024060                            .WORD   DUMPER
10027 034056  012746  007504                      MOV     #PHR.6,-(SP)          ;                                   5379
10028 034062  012746  006276                      MOV     #WRD.1,-(SP)
10029 034066  012746  006754                      MOV     #WRD.43,-(SP)
10030 034072  012746  007366                      MOV     #PHR.1,-(SP)
10031 034076  012746  006302                      MOV     #WRD.2,-(SP)
10032 034102  012746  006062                      MOV     #FIV.FMT,-(SP)
10033 034106  012746  000006                      MOV     #6,-(SP)
10034 034112  010600                            MOV     SP,R0                 ; SP,*
10035 034114  104414                            TRAP    14
10036 034116  062706  000016                      ADD     #16,SP                ;                                   5377
10037 034122  000427                            BR      3$                    ;                                   5382
10038 034124  105777  157074            2$:     TSTB    @ML.REG+50            ;                                   5386
10039 034130  100030                            BPL     4$
10040 034132  104455                            TRAP    55                    ;                                   5389
10041 034134  000020                            .WORD   20
10042 034136  010464                            .WORD   ASYNC
10043 034140  024060                            .WORD   DUMPER
10044 034142  012746  007472                      MOV     #PHR.5,-(SP)          ;                                   5390
10045 034146  012746  006276                      MOV     #WRD.1,-(SP)
10046 034152  012746  006754                      MOV     #WRD.43,-(SP)
10047 034156  012746  007404                      MOV     #PHR.2,-(SP)
10048 034162  012746  006302                      MOV     #WRD.2,-(SP)
10049 034166  012746  006062                      MOV     #FIV.FMT,-(SP)
10050 034172  012746  000006                      MOV     #6,-(SP)
10051 034176  010600                            MOV     SP,R0                 ; SP,*
10052 034200  104414                            TRAP    14
10053 034202  012702  000001            3$:     MOV     #1,R2                 ; *,DODU.FLG                        5391
10054 034206  062706  000016                      ADD     #16,SP                ;                                   5388
10055 034212  132777  000001  157014    4$:     BITB    #1,@ML.REG+60         ;                                   5394
10056 034220  001426                            BEQ     5$
10057 034222  104455                            TRAP    55                    ;                                   5397
10058 034224  000021                            .WORD   21
10059 034226  010464                            .WORD   ASYNC
10060 034230  024060                            .WORD   DUMPER
10061 034232  012746  006506                      MOV     #WRD.19,-(SP)         ;                                   5398
10062 034236  012746  007756                      MOV     #FNC.4,-(SP)
10063 034242  012746  006426                      MOV     #WRD.12,-(SP)
10064 034246  012746  007472                      MOV     #PHR.5,-(SP)
10065 034252  012746  006314                      MOV     #WRD.3,-(SP)
10066 034256  012746  006062                      MOV     #FIV.FMT,-(SP)
10067 034262  012746  000006                      MOV     #6,-(SP)
10068 034266  010600                            MOV     SP,R0                 ; SP,*
10069 034270  104414                            TRAP    14
10070 034272  062706  000016                      ADD     #16,SP                ;                                   5396
10071 034276  032777  020000  156730    5$:     BIT     #20000,@ML.REG+60     ;                                   5401
10072 034304  001426                            BEQ     6$
10073 034306  104455                            TRAP    55                    ;                                   5404
10074 034310  000022                            .WORD   22
10075 034312  010464                            .WORD   ASYNC
10076 034314  024060                            .WORD   DUMPER
10077 034316  012746  006506                      MOV     #WRD.19,-(SP)         ;                                   5405
```

```
10079                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
10080                                   ;                                                       14-May-1981 13:05:08    PA:<
10081
10082 034322  012746  007756                     MOV     #FNC.4,-(SP)
10083 034326  012746  006426                     MOV     #WRD.12,-(SP)
10084 034332  012746  007472                     MOV     #PHR.5,-(SP)
10085 034336  012746  006322                     MOV     #WRD.4,-(SP)
10086 034342  012746  006062                     MOV     #FIV.FMT,-(SP)
10087 034346  012746  000006                     MOV     #6,-(SP)
10088 034352  010600                           MOV     SP,R0                   ; SP,*
10089 034354  104414                           TRAP    14
10090 034356  062706  000016                     ADD     #16,SP                  ;                                       5403
10091 034362  012700  000050             6$:     MOV     #50,R0                  ; *,$$TMP2                              5408
10092 034366  001410             7$:     BEQ     10$
10093 034370  016701  145522                     MOV     L$DLY,R1                ; *,$$TMP1
10094 034374  001403                           BEQ     9$
10095 034376  005016             8$:     CLR     (SP)                    ; $$TMP
10096 034400  005301                           DEC     R1                      ; $$TMP1
10097 034402  001375                           BNE     8$
10098 034404  005300             9$:     DEC     R0                      ; $$TMP2
10099 034406  000767                           BR      7$
10100 034410  132777  000200  156606 10$:     BITB    #200,@ML.REG+50         ;                                       5410
10101 034416  001106                           BNE     15$
10102 034420  132777  000001  156526           BITB    #1,@ML.REG              ;                                       5414
10103 034426  001452                           BEQ     13$
10104 034430  152777  000040  156556           BISB    #40,@ML.REG+40          ;                                       5416
10105 034436  016701  157140                     MOV     ML.DUT,R1
10106 034442  042701  177770                     BIC     #177770,R1
10107 034446  142777  000007  156540           BICB    #7,@ML.REG+40
10108 034454  150177  156534                     BISB    R1,@ML.REG+40
10109 034460  132777  000001  156466           BITB    #1,@ML.REG              ;                                       5419
10110 034466  001405                           BEQ     11$
10111 034470  104455                           TRAP    55
10112 034472  000023                           .WORD   23
10113 034474  010464                           .WORD   ASYNC
10114 034476  024060                           .WORD   DUMPER
10115 034500  000404                           BR      12$
10116 034502  104455             11$:    TRAP    55
10117 034504  000024                           .WORD   24
10118 034506  010526                           .WORD   SYNC
10119 034510  024060                           .WORD   DUMPER
10120 034512  012746  006506             12$:    MOV     #WRD.19,-(SP)           ;                                       5422
10121 034516  012746  007756                     MOV     #FNC.4,-(SP)
10122 034522  012746  006416                     MOV     #WRD.11,-(SP)
10123 034526  012746  007404                     MOV     #PHR.2,-(SP)
10124 034532  012746  006276                     MOV     #WRD.1,-(SP)
10125 034536  012746  006062                     MOV     #FIV.FMT,-(SP)
10126 034542  012746  000006                     MOV     #6,-(SP)
10127 034546  010600                           MOV     SP,R0                   ; SP,*
10128 034550  104414                           TRAP    14
10129 034552  000424                           BR      14$                     ;                                       5414
10130 034554  104455             13$:    TRAP    55                      ;                                       5426
10131 034556  000025                           .WORD   25
10132 034560  010464                           .WORD   ASYNC
10133 034562  024060                           .WORD   DUMPER
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                                                                                        5427
034564  012746  006506                        MOV     #WRD.19,-(SP)           ;
034570  012746  007756                        MOV     #FNC.4,-(SP)
034574  012746  006416                        MOV     #WRD.11,-(SP)
034600  012746  007366                        MOV     #PHR.1,-(SP)
034604  012746  006302                        MOV     #WRD.2,-(SP)
034610  012746  006062                        MOV     #FIV.FMT,-(SP)
034614  012746  000006                        MOV     #6,-(SP)
034620  010600                                MOV     SP,R0                   ; SP,*
034622  104414                                TRAP    14
034624  012702  000001                14$:    MOV     #1,R2                   ; *,DODU.FLG                    5430
034630  062706  000016                        ADD     #16,SP                  ;                               5412
034634  132777  000001  156312        15$:    BITB    #1,@ML.REG              ;                               5433
034642  001455                                BEQ     18$
034644  152777  000040  156342                BISB    #40,@ML.REG+40          ;                               5435
034652  016701  156724                        MOV     ML.DUT,R1
034656  042701  177770                        BIC     #177770,R1
034662  142777  000007  156324                BICB    #7,@ML.REG+40
034670  150177  156320                        BISB    R1,@ML.REG+40
034674  132777  000001  156252                BITB    #1,@ML.REG              ;                               5438
034702  001405                                BEQ     16$
034704  104455                                TRAP    55
034706  000026                                .WORD   26
034710  010464                                .WORD   ASYNC
034712  024060                                .WORD   DUMPER
034714  000404                                BR      17$
034716  104455                        16$:    TRAP    55
034720  000027                                .WORD   27
034722  010526                                .WORD   SYNC
034724  024060                                .WORD   DUMPER
034726  012746  006506                17$:    MOV     #WRD.19,-(SP)           ;                               5441
034732  012746  007756                        MOV     #FNC.4,-(SP)
034736  012746  006416                        MOV     #WRD.11,-(SP)
034742  012746  007404                        MOV     #PHR.2,-(SP)
034746  012746  006276                        MOV     #WRD.1,-(SP)
034752  012746  006062                        MOV     #FIV.FMT,-(SP)
034756  012746  000006                        MOV     #6,-(SP)
034762  010600                                MOV     SP,R0                   ; SP,*
034764  104414                                TRAP    14
034766  012702  000001                        MOV     #1,R2                   ; *,DODU.FLG                    5442
034772  062706  000016                        ADD     #16,SP                  ;                               5435
034776  104467                18$:    TRAP    67                      ;                               5443
035000  006000                                ROR     R0
035002  103002                                BHIS    19$
035004  000167  176700                        JMP     1$
035010  005302                19$:    DEC     R2                      ; DODU.FLG                      5447
035012  001004                                BNE     20$
035014  016700  156560                        MOV     ML.LUN,R0               ;                               5450
035020  104451                                TRAP    51
035022  104444                                TRAP    44
035024  005726                20$:    TST     (SP)+                   ;                               5336
035026  000207                                RTS     PC
```

```
10191                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
10192                                   ;                                                       14-May-1981 13:05:08    PA:<
10193
10194                                   ; Routine Size:  299 words
10195                                   ; Maximum stack depth per invocation:  18 words
10200
10201
10205
10206                                           .SBTTL  T13
10210 035030                            T13::
10211 035030  004767  176646            1$:     JSR     PC,$T13                         ;       5452
10212 035034  104466                            TRAP    66
10213 035036  006000                            ROR     R0
10214 035040  103773                            BLO     1$
10215 035042  000207                            RTS     PC
10216
10217                                   ; Routine Size:  6 words
10218                                   ; Maximum stack depth per invocation:  0 words
10223
10224
10225 ;          5455  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (64)

```
10227 ;ML4
10228 ;
10229
10230 ;          5456  !
10231 ;          5457  BGNTST;
10232 ;          5458
10233 ;          5459  !++
10234 ;          5460  ! TEST NUMBER:  TST 14
10235 ;          5461  !
10236 ;          5462  ! TEST NAME:    WRITE FUNCTION TEST
10237 ;          5463  !
10238 ;          5464  ! TEST DESCRIPTION:
10239 ;          5465  !       TEST IF THE DRIVE CAN PERFORM A WRITE FUNCTION WITHOUT
10240 ;          5466  !       HANGING THE DRIVE.
10241 ;          5467  !
10242 ;          5468  !       A WRITE FUNCTION IS WRITTEN INTO MLCS1.  THEN GO AND ERROR BITS ARE
10243 ;          5469  !       CHECKED FOR CORRECT STATUS.  THIS UNIT IS DROPPED ON DETECTED ERRORS.
10244 ;          5470  !--
10245 ;          5471
10246 ;          5472  local
10247 ;          5473      DODU_FLG;                                   !DROP UNIT FLAG
10248 ;          5474
10249 ;          5475  BGNSUB;
10250 ;          5476  CLR_MBUS;
10251 ;          5477  DODU_FLG = ZERO;
10252 ;          5478  FIRST_BLK_XFER ();                              !SET UP A FIRST BLOCK XFERR
10253 ;          5479  MLCS1 = write;                                  !DO A WRITE FUNCTION
10254 ;          5480
10255 ;          5481  if .GO IS_NOT_SET                               !SEE IF THE GO IS SET
10256 ;          5482  then
10257 ;          5483      begin                                       !ERROR IF NOT SET
10258 ;          5484      ERRDF (24, ASYNC, DUMPER);
10259 ;          5485      PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_5, WRD_19);
10260 ;          5486
10261 ;          5487      if .DRY IS_NOT_SET                          !SEE IF DRY SET WITH GO CLEAR
10262 ;          5488      then
10263 ;          5489          begin
10264 ;          5490          ERRDF (25, ASYNC, DUMPER);
10265 ;          5491          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
10266 ;          5492          end;
10267 ;          5493
10268 ;          5494      DODU_FLG = ONE;                             !SET DODU_FLG
10269 ;          5495      end
10270 ;          5496  else                                            !GO IS SET DURING FUNCTION
10271 ;          5497
10272 ;          5498      if .DRY IS_SET                              !SEE IF DRY CLEAR WITH GO SET
10273 ;          5499      then
10274 ;          5500          begin                                   !ERROR IF SET
10275 ;          5501          ERRDF (26, ASYNC, DUMPER);
10276 ;          5502          PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_5);
10277 ;          5503          DODU_FLG = ONE;
10278 ;          5504          end;
10279 ;          5505
10280 ;          5506  if .ILF IS_SET                                 !DID FUNCTION CAUSE ILF
10281 ;          5507  then
```

```
10283 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
10284 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (64)
10285 ;
10286 ;          5508      begin                                          !ERROR IF YES
10287 ;          5509      ERRDF (27, ASYNC, DUMPER);
10288 ;          5510      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_5, WRD_19);
10289 ;          5511      end;
10290 ;          5512
10291 ;          5513  if .OPI IS_SET                                  !DID FUNCTION CAUSE OPI
10292 ;          5514  then
10293 ;          5515      begin                                        !ERROR IF YES
10294 ;          5516      ERRDF (28, ASYNC, DUMPER);
10295 ;          5517      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_5, WRD_19);
10296 ;          5518      end;
10297 ;          5519
10298 ;          5520  DELAY (FRTY_US);                               !WAIT FOR XFERR TC COMPLETE
10299 ;          5521
10300 ;          5522  if .DRY IS_NOT_SET                             !SEE IF DRY CLEARED AFTER XFERR
10301 ;          5523  then
10302 ;          5524      begin
10303 ;          5525
10304 ;          5526      if .GO IS_SET                              !TST GO CLR IF DRY NOT SET
10305 ;          5527      then
10306 ;          5528          begin
10307 ;          5529          CLR_MBUS;                              !CLEAR GO IF STILL SET
10308 ;          5530
10309 ;          5531          if .GO IS_SET then ERRDF (29, ASYNC, DUMPER) else ERRDF (30, SYNC, DUMPER);
10310 ;          5532
10311 ;          5533                                                 !TST GO TO DETERMINE FAILING MOD
10312 ;          5534          PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_5, WRD_19);
10313 ;          5535          end
10314 ;          5536      else                                       !DRY NOT SET AND GO CLEARED
10315 ;          5537          begin                                  !REPORT ERROR
10316 ;          5538          ERRDF (31, ASYNC, DUMPER);
10317 ;          5539          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_5, WRD_19);
10318 ;          5540          end;
10319 ;          5541
10320 ;          5542      DODU_FLG = ONE;                            !SET DODU_FLG
10321 ;          5543      end;
10322 ;          5544
10323 ;          5545  if .GO IS_SET                                  !SEE IF GO CLEARED AFTER XFERR.
10324 ;          5546  then
10325 ;          5547      begin
10326 ;          5548      CLR_MBUS;                                  !CLEAR GO IF STILL SET
10327 ;          5549
10328 ;          5550      if .GO IS_SET then ERRDF (32, ASYNC, DUMPER) else ERRDF (33, SYNC, DUMPER);
10329 ;          5551
10330 ;          5552                                                 !TST GO TO DETERMINE FAILING MOD
10331 ;          5553      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_5, WRD_19);
10332 ;          5554      DODU_FLG = ONE;
10333 ;          5555      end;
10334 ;          5556
10335 ;          5557  ENDSUB;
10336 ;          5558
10337 ;          5559  if .TRE IS_SET                                 !SEE IF XFERR CAUSED A TRANSFER ERROR
```

```
10339 :ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
10340 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (64)
10341
10342 :          5560  then
10343 :          5561      begin                                    !REPORT ERROR IF SET AND CONTINUE TESTING
10344 :          5562      ERRDF (115, INTER, DUMPER);
10345 :          5563      PRINTB (SIX_FMT, WRD_61, WRD_20, PHR_5, WRD_12, FNC_5, WRD_19);
10346 :          5564      end;
10347 :          5565
10348 :          5566  if .DODU_FLG IS_SET                          !DROP THIS UNIT IF DODU_FLG SET
10349 :          5567  then
10350 :          5568      begin
10351 :          5569      DODU (.ML_LUN);
10352 :          5570      DOCLN;
10353 :          5571      end;
10354 :          5572
10355 :          5573  ENDTST;
10359
10360                                        .SBTTL  $T14
10364 035044  004167  146774          $T14: JSR     R1,$SAVE2                    ;                    5454
10365 035050  005746                        TST     -(SP)
10366 035052  104402                  1$:   TRAP    2                            ;                    5473
10367 035054  152777  000040  156132        BISB    #40,@ML.REG+40               ;                    5475
10368 035062  016701  156514              MOV     ML.DUT,R1
10369 035066  042701  177770              BIC     #177770,R1
10370 035072  142777  000007  156114        BICB    #7,@ML.REG+40
10371 035100  150177  156110              BISB    R1,@ML.REG+40
10372 035104  005002                       CLR     R2                           ; DODU.FLG           5477
10373 035106  004767  160726              JSR     PC,FIRST.BLK.XFER            ;                    5478
10374 035112  012777  000061  156034        MOV     #61,@ML.REG                  ;                    5479
10375 035120  132777  000001  156026        BITB    #1,@ML.REG                   ;                    5481
10376 035126  001057                       BNE     2$
10377 035130  104455                       TRAP    55                           ;                    5484
10378 035132  000030                       .WORD   30
10379 035134  010464                       .WORD   ASYNC
10380 035136  024060                       .WORD   DUMPER
10381 035140  012746  006506              MOV     #WRD.19,-(SP)                ;                    5485
10382 035144  012746  007774              MOV     #FNC.5,-(SP)
10383 035150  012746  006426              MOV     #WRD.12,-(SP)
10384 035154  012746  007366              MOV     #PHR.1,-(SP)
10385 035160  012746  006276              MOV     #WRD.1,-(SP)
10386 035164  012746  006062              MOV     #FIV.FMT,-(SP)
10387 035170  012746  000006              MOV     #6,-(SP)
10388 035174  010600                       MOV     SP,R0                        ; SP,*
10389 035176  104414                       TRAP    14
10390 035200  132777  000200  156016        BITB    #200,@ML.REG+50              ;                    5487
10391 035206  001056                       BNE     3$
10392 035210  104455                       TRAP    55                           ;                    5490
10393 035212  000031                       .WORD   31
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                .WORD   ASYNC
                                                .WORD   DUMPER
                                                MOV     #PHR.6,-(SP)            ;                                       5491
                                                MOV     #WRD.1,-(SP)
                                                MOV     #WRD.43,-(SP)
                                                MOV     #PHR.1,-(SP)
                                                MOV     #WRD.2,-(SP)
                                                MOV     #FIV.FMT,-(SP)
                                                MOV     #6,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                ADD     #16,SP                  ;                                       5489
                                                BR      3$                      ;                                       5494
                                        2$:     TSTB    @ML.REG+50              ;                                       5498
                                                BPL     4$
                                                TRAP    55                      ;                                       5501
                                                .WORD   32
                                                .WORD   ASYNC
                                                .WORD   DUMPER
                                                MOV     #PHR.5,-(SP)            ;                                       5502
                                                MOV     #WRD.1,-(SP)
                                                MOV     #WRD.43,-(SP)
                                                MOV     #PHR.2,-(SP)
                                                MOV     #WRD.2,-(SP)
                                                MOV     #FIV.FMT,-(SP)
                                                MOV     #6,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                        3$:     MOV     #1,R2                   ; *,DODU.FLG                            5503
                                                ADD     #16,SP                  ;                                       5500
                                        4$:     BITB    #1,@ML.REG+60           ;                                       5506
                                                BEQ     5$
                                                TRAP    55                      ;                                       5509
                                                .WORD   33
                                                .WORD   ASYNC
                                                .WORD   DUMPER
                                                MOV     #WRD.19,-(SP)           ;                                       5510
                                                MOV     #FNC.5,-(SP)
                                                MOV     #WRD.12,-(SP)
                                                MOV     #PHR.5,-(SP)
                                                MOV     #WRD.3,-(SP)
                                                MOV     #FIV.FMT,-(SP)
                                                MOV     #6,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                ADD     #16,SP                  ;                                       5508
                                        5$:     BIT     #20000,@ML.REG+60       ;                                       5513
                                                BEQ     6$
                                                TRAP    55                      ;                                       5516
                                                .WORD   34
                                                .WORD   ASYNC
                                                .WORD   DUMPER
```

```
                                                                                                14-May-1981 13:48:54    TOPS
                                                                                                14-May-1981 13:05:08    PA:<
10451                                   ;ML4
10452                                   ;
10453
10454 035460  012746  006506                      MOV     #WRD.19,-(SP)                 ;                                 5517
10455 035464  012746  007774                      MOV     #FNC.5,-(SP)
10456 035470  012746  006426                      MOV     #WRD.12,-(SP)
10457 035474  012746  007472                      MOV     #PHR.5,-(SP)
10458 035500  012746  006322                      MOV     #WRD.4,-(SP)
10459 035504  012746  006062                      MOV     #FIV.FMT,-(SP)
10460 035510  012746  000006                      MOV     #6,-(SP)
10461 035514  010600                             MOV     SP,R0                         ; SP,*
10462 035516  104414                             TRAP    14
10463 035520  062706  000016                      ADD     #16,SP                        ;                                 5515
10464 035524  012700  000050              6$:     MOV     #50,R0                        ; *,$$TMP2                        5520
10465 035530  001410              7$:     BEQ     10$
10466 035532  016701  144360                      MOV     LSDLY,R1                      ; *,$$TMP1
10467 035536  001403                             BEQ     9$
10468 035540  005016              8$:     CLR     (SP)                          ; $$TMP
10469 035542  005301                             DEC     R1                            ; $$TMP1
10470 035544  001375                             BNE     8$
10471 035546  005300              9$:     DEC     R0                            ; $$TMP2
10472 035550  000767                             BR      7$
10473 035552  132777  000200  155444  10$:     BITB    #200,@ML.REG+50               ;                                 5522
10474 035560  001106                             BNE     15$
10475 035562  132777  000001  155364            BITB    #1,@ML.REG                    ;                                 5526
10476 035570  001452                             BEQ     13$
10477 035572  152777  000040  155414            BISB    #40,@ML.REG+40                ;                                 5528
10478 035600  016701  155776                      MOV     ML.DUT,R1
10479 035604  042701  177770                      BIC     #177770,R1
10480 035610  142777  000007  155376            BICB    #7,@ML.REG+40
10481 035616  150177  155372                      BISB    R1,@ML.REG+40
10482 035622  132777  000001  155324            BITB    #1,@ML.REG                    ;                                 5531
10483 035630  001405                             BEQ     11$
10484 035632  104455                             TRAP    55
10485 035634  000035                             .WORD   35
10486 035636  010464                             .WORD   ASYNC
10487 035640  024060                             .WORD   DUMPER
10488 035642  000404                             BR      12$
10489 035644  104455              11$:    TRAP    55
10490 035646  000036                             .WORD   36
10491 035650  010526                             .WORD   SYNC
10492 035652  024060                             .WORD   DUMPER
10493 035654  012746  006506              12$:    MOV     #WRD.19,-(SP)                 ;                                 5534
10494 035660  012746  007774                      MOV     #FNC.5,-(SP)
10495 035664  012746  006416                      MOV     #WRD.11,-(SP)
10496 035670  012746  007404                      MOV     #PHR.2,-(SP)
10497 035674  012746  006276                      MOV     #WRD.1,-(SP)
10498 035700  012746  006062                      MOV     #FIV.FMT,-(SP)
10499 035704  012746  000006                      MOV     #6,-(SP)
10500 035710  010600                             MOV     SP,R0                         ; SP,*
10501 035712  104414                             TRAP    14
10502 035714  000424                             BR      14$                           ;                                 5526
10503 035716  104455              13$:    TRAP    55                            ;                                 5538
10504 035720  000037                             .WORD   37
10505 035722  010464                             .WORD   ASYNC
```

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10507                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
10508                                   ;                                                       14-May-1981 13:05:08    PA:<
10509
10510 035724  024060                            .WORD   DUMPER
10511 035726  012746  006506                    MOV     #WRD.19,-(SP)           ;                               5539
10512 035732  012746  007774                    MOV     #FNC.5,-(SP)
10513 035736  012746  006416                    MOV     #WRD.11,-(SP)
10514 035742  012746  007366                    MOV     #PHR.1,-(SP)
10515 035746  012746  006302                    MOV     #WRD.2,-(SP)
10516 035752  012746  006062                    MOV     #FIV.FMT,-(SP)
10517 035756  012746  000006                    MOV     #6,-(SP)
10518 035762  010600                            MOV     SP,R0                   ; SP,*
10519 035764  104414                            TRAP    14
10520 035766  012702  000001            14$:    MOV     #1,R2                   ; *,DODU.FLG                    5542
10521 035772  062706  000016                    ADD     #16,SP                  ;                               5524
10522 035776  132777  000001  155150    15$:    BITB    #1,@ML.REG              ;                               5545
10523 036004  001455                            BEQ     18$
10524 036006  152777  000040  155200            BISB    #40,@ML.REG+40          ;                               5547
10525 036014  016701  155562                    MOV     ML.DUT,R1
10526 036020  042701  177770                    BIC     #177770,R1
10527 036024  142777  000007  155162            BICB    #7,@ML.REG+40
10528 036032  150177  155156                    BISB    R1,@ML.REG+40
10529 036036  132777  000001  155110            BITB    #1,@ML.REG              ;                               5550
10530 036044  001405                            BEQ     16$
10531 036046  104455                            TRAP    55
10532 036050  000040                            .WORD   40
10533 036052  010464                            .WORD   ASYNC
10534 036054  024060                            .WORD   DUMPER
10535 036056  000404                            BR      17$
10536 036060  104455            16$:    TRAP    55
10537 036062  000041                            .WORD   41
10538 036064  010526                            .WORD   SYNC
10539 036066  024060                            .WORD   DUMPER
10540 036070  012746  006506            17$:    MOV     #WRD.19,-(SP)           ;                               5553
10541 036074  012746  007774                    MOV     #FNC.5,-(SP)
10542 036100  012746  006416                    MOV     #WRD.11,-(SP)
10543 036104  012746  007404                    MOV     #PHR.2,-(SP)
10544 036110  012746  006276                    MOV     #WRD.1,-(SP)
10545 036114  012746  006062                    MOV     #FIV.FMT,-(SP)
10546 036120  012746  000006                    MOV     #6,-(SP)
10547 036124  010600                            MOV     SP,R0                   ; SP,*
10548 036126  104414                            TRAP    14
10549 036130  012702  000001                    MOV     #1,R2                   ; *,DODU.FLG                    5554
10550 036134  062706  000016                    ADD     #16,SP                  ;                               5547
10551 036140  104467            18$:    TRAP    67                      ;                               5555
10552 036142  006000                            ROR     R0
10553 036144  103002                            BHIS    19$
10554 036146  000167  176700                    JMP     1$
10555 036152  032777  040000  154774    19$:    BIT     #40000,@ML.REG          ;                               5559
10556 036160  001430                            BEQ     20$
10557 036162  104455                            TRAP    55                      ;                               5562
10558 036164  000163                            .WORD   163
10559 036166  010672                            .WORD   INTER
10560 036170  024060                            .WORD   DUMPER
10561 036172  012746  006506                    MOV     #WRD.19,-(SP)           ;                               5563
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                MOV     #FNC.5,-(SP)
                                                MOV     #WRD.12,-(SP)
                                                MOV     #PHR.5,-(SP)
                                                MOV     #WRD.20,-(SP)
                                                MOV     #WRD.61,-(SP)
                                                MOV     #SIX.FMT,-(SP)
                                                MOV     #7,-(SP)
                                                MOV     SP,R0                           ; SP,*
                                                TRAP    14
                                                ADD     #20,SP                          ;                                       5561
                                        20$:    DEC     R2                              ; DODU.FLG                              5566
                                                BNE     21$
                                                MOV     ML.LUN,R0                       ;                                       5569
                                                TRAP    51
                                                TRAP    44
                                        21$:    TST     (SP)+                           ;                                       5454
                                                RTS     PC

                                        ; Routine Size:  327 words
                                        ; Maximum stack depth per invocation:  18 words


                                                .SBTTL  T14
                                        T14::
                                        1$:     JSR     PC,$T14                         ;                                       5571
                                                TRAP    66
                                                ROR     R0
                                                BLO     1$
                                                RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words

                ;               5574    !<BLF/PAGE>
```

```
10617 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
10618 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (65)
10619
10620 ;          5575  !
10621 ;          5576  !
10622 ;          5577  BGNTST;
10623 ;          5578
10624 ;          5579  !++
10625 ;          5580  ! TEST NUMBER:  TST 15
10626 ;          5581  !
10627 ;          5582  ! TEST NAME:    READ FUNCTION TEST
10628 ;          5583  !
10629 ;          5584  ! TEST DESCRIPTION:
10630 ;          5585  !
10631 ;          5586  !       TEST IF THE DRIVE CAN PERFORM
10632 ;          5587  !       A READ FUNCTION WITHOUT
10633 ;          5588  !       HANGING THE DRIVE.
10634 ;          5589  !
10635 ;          5590  !       A READ FUNCTION IS WRITTEN
10636 ;          5591  !       INTO MLCS1
10637 ;          5592  !
10638 ;          5593  !       THEN GO AND ERROR BITS ARE
10639 ;          5594  !       CHECKED FOR CORRECT STATES.
10640 ;          5595  !
10641 ;          5596  !--
10642 ;          5597
10643 ;          5598  local
10644 ;          5599      DODU_FLG;                                !DROP UNIT FLAG
10645 ;          5600
10646 ;          5601  BGNSUB;
10647 ;          5602  CLR_MBUS;
10648 ;          5603  DODU_FLG = ZERO;
10649 ;          5604  FIRST_BLK_XFER ();                           !SET UP A FIRST BLK XFERR
10650 ;          5605  MLCS1 = read;                                !DO A READ FUNCTION
10651 ;          5606
10652 ;          5607  if .GO IS_NOT_SET                            !SEE IF GO GOT SET
10653 ;          5608  then
10654 ;          5609      begin                                    !ERROR IF CLEAR
10655 ;          5610      ERRDF (34, ASYNC, DUMPER);
10656 ;          5611      PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_6, WRD_19);
10657 ;          5612
10658 ;          5613      if .DRY IS_NOT_SET                       !TST DRY SET WITH GO CLEAR
10659 ;          5614      then
10660 ;          5615          begin                                !ERROR IF NOT SET
10661 ;          5616          ERRDF (35, ASYNC, DUMPER);
10662 ;          5617          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
10663 ;          5618          end;
10664 ;          5619
10665 ;          5620      DODU_FLG = ONE;                          !SET DODU_FLG
10666 ;          5621      end
10667 ;          5622  else                                         !GO BIT GOT SET
10668 ;          5623
10669 ;          5624      if .DRY IS_SET                           !SEE IF DRY IS CLEAR
10670 ;          5625      then
10671 ;          5626          begin                                !ERROR IF SET
10672 ;ML4                                                        14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
10673 ;                                                          14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (65)
```

```
10674
10675 ;          5627          ERRDF (36, ASYNC, DUMPER);
10676 ;          5628          PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_5);
10677 ;          5629          DODU_FLG = ONE;
10678 ;          5630          end;
10679 ;          5631
10680 ;          5632  if .ILF IS_SET                                  !DID FUNCTION CAUSE ILF
10681 ;          5633  then
10682 ;          5634      begin                                       !ERROR IF YES
10683 ;          5635      ERRDF (37, ASYNC, DUMPER);
10684 ;          5636      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_6, WRD_19);
10685 ;          5637      end;
10686 ;          5638
10687 ;          5639  if .OPI IS_SET                                  !DID FUNCTION CAUSE OPI
10688 ;          5640  then
10689 ;          5641      begin                                       !ERROR IF YES
10690 ;          5642      ERRDF (38, ASYNC, DUMPER);
10691 ;          5643      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_6, WRD_19);
10692 ;          5644      end;
10693 ;          5645
10694 ;          5646  DELAY (FRTY_US);                                !WAIT FOR XFERR TO COMPLETE
10695 ;          5647
10696 ;          5648  if .DRY IS_NOT_SET                              !IS DRY SET AFTER XFERR
10697 ;          5649  then
10698 ;          5650      begin
10699 ;          5651
10700 ;          5652      if .GO IS_SET                               !TEST GO CLEAR WITH DRY NOT SET
10701 ;          5653      then
10702 ;          5654          begin
10703 ;          5655          CLR_MBUS;                               !CLEAR GO
10704 ;          5656
10705 ;          5657          if .GO IS_SET then ERRDF (39, ASYNC, DUMPER) else ERRDF (40, SYNC, DUMPER);
10706 ;          5658
10707 ;          5659                                                  !TST GO TO DETERMINE FAILING MOD
10708 ;          5660          PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_6, WRD_19);
10709 ;          5661          end
10710 ;          5662      else                                        !GO BIT CLEAR WITH DRY NOT SET
10711 ;          5663          begin                                   !REPORT ERROR
10712 ;          5664          ERRDF (41, ASYNC, DUMPER);
10713 ;          5665          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_6, WRD_19);
10714 ;          5666          end;
10715 ;          5667
10716 ;          5668      DODU_FLG = ONE;                             !SET DODU_FLG
10717 ;          5669      end;
10718 ;          5670
10719 ;          5671  if .GO IS_SET                                   !SEE IF GO CLEAR AFTER XFERR
10720 ;          5672  then
10721 ;          5673      begin
10722 ;          5674      CLR_MBUS;                                   !CLEAR GO IF STILL SET
10723 ;          5675
10724 ;          5676      if .GO IS_SET then ERRDF (42, ASYNC, DUMPER) else ERRDF (43, SYNC, DUMPER);
10725 ;          5677
10726 ;          5678                                                  !TST GO TO DETERMINE FAILING MOD
10727 ;ML4                                                             14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
10728 ;                                                               14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (65)
10729
10730 ;          5679      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_6, WRD_19);
```

```
 10731 ;          5680      DODU_FLG = ONE;
 10732 ;          5681      end;
 10733 ;          5682
 10734 ;          5683  ENDSUB;
 10735 ;          5684
 10736 ;          5685  if .TRE IS_SET                          !SEE IF XFERR CAUSED A TRANSFER ERROR
 10737 ;          5686  then
 10738 ;          5687      begin                               !REPORT ERROR IF SET AND CONTINUE TESTING
 10739 ;          5688      ERRDF (116, INTER, DUMPER);
 10740 ;          5689      PRINTB (SIX_FMT, WRD_61, WRD_20, PHR_5, WRD_12, FNC_6, WRD_19);
 10741 ;          5690      DODU_FLG = ONE;
 10742 ;          5691      end;
 10743 ;          5692
 10744 ;          5693  if .DODU_FLG IS_SET                      !DROP THIS UNIT IF DODU_FLG SET
 10745 ;          5694  then
 10746 ;          5695      begin
 10747 ;          5696      DODU (.ML_LUN);
 10748 ;          5697      DOCLN;
 10749 ;          5698      end;
 10750 ;          5699
 10751 ;          5700  ENDTST;
 10755
 10756                                        .SBTTL  $T15
 10760 036276  004167  145542        $T15:   JSR     R1,$SAVE2                   ;                    5573
 10761 036302  005746                        TST     -(SP)
 10762 036304  104402                1$:     TRAP    2                           ;                    5599
 10763 036306  152777  000040  154700        BISB    #40,@ML.REG+40              ;                    5601
 10764 036314  016701  155262                MOV     ML.DUT,R1
 10765 036320  042701  177770                BIC     #177770,R1
 10766 036324  142777  000007  154662        BICB    #7,@ML.REG+40
 10767 036332  150177  154656                BISB    R1,@ML.REG+40
 10768 036336  005002                        CLR     R2                          ; DODU.FLG           5603
 10769 036340  004767  157474                JSR     PC,FIRST.BLK.XFER           ;                    5604
 10770 036344  012777  000071  154602        MOV     #71,@ML.REG                 ;                    5605
 10771 036352  132777  000001  154574        BITB    #1,@ML.REG                  ;                    5607
 10772 036360  001057                        BNE     2$
 10773 036362  104455                        TRAP    55                          ;                    5610
 10774 036364  000042                        .WORD   42
 10775 036366  010464                        .WORD   ASYNC
 10776 036370  024060                        .WORD   DUMPER
 10777 036372  012746  006506                MOV     #WRD.19,-(SP)               ;                    5611
 10778 036376  012746  010004                MOV     #FNC.6,-(SP)
 10779 036402  012746  006426                MOV     #WRD.12,-(SP)
 10780 036406  012746  007366                MOV     #PHR.1,-(SP)
 10781 036412  012746  006276                MOV     #WRD.1,-(SP)
 10782                               ;ML4                                  14-May-1981 13:48:54    TOPS
 10783                               ;                                     14-May-1981 13:05:08    PA:<
 10784
 10785 036416  012746  006062                MOV     #FIV.FMT,-(SP)
 10786 036422  012746  000006                MOV     #6,-(SP)
 10787 036426  010600                        MOV     SP,R0                       ; SP,*
 10788 036430  104414                        TRAP    14
 10789 036432  132777  000200  154564        BITB    #200,@ML.REG+50             ;                    5613
 10790 036440  001056                        BNE     3$
 10791 036442  104455                        TRAP    55                          ;                    5616
 10792 036444  000043                        .WORD   43
 10793 036446  010464                        .WORD   ASYNC
```

```
10794 036450  024060                        .WORD   DUMPER
10795 036452  012746  007504                MOV     #PHR.6,-(SP)          ;                                5617
10796 036456  012746  006276                MOV     #WRD.1,-(SP)
10797 036462  012746  006754                MOV     #WRD.43,-(SP)
10798 036466  012746  007366                MOV     #PHR.1,-(SP)
10799 036472  012746  006302                MOV     #WRD.2,-(SP)
10800 036476  012746  006062                MOV     #FIV.FMT,-(SP)
10801 036502  012746  000006                MOV     #6,-(SP)
10802 036506  010600                        MOV     SP,R0                 ; SP,*
10803 036510  104414                        TRAP    14
10804 036512  062706  000016                ADD     #16,SP                ;                                5615
10805 036516  000427                        BR      3$                    ;                                5620
10806 036520  105777  154500        2$:     TSTB    @ML.REG+50            ;                                5624
10807 036524  100030                        BPL     4$
10808 036526  104455                        TRAP    55                    ;                                5627
10809 036530  000044                        .WORD   44
10810 036532  010464                        .WORD   ASYNC
10811 036534  024060                        .WORD   DUMPER
10812 036536  012746  007472                MOV     #PHR.5,-(SP)          ;                                5628
10813 036542  012746  006276                MOV     #WRD.1,-(SP)
10814 036546  012746  006754                MOV     #WRD.43,-(SP)
10815 036552  012746  007404                MOV     #PHR.2,-(SP)
10816 036556  012746  006302                MOV     #WRD.2,-(SP)
10817 036562  012746  006062                MOV     #FIV.FMT,-(SP)
10818 036566  012746  000006                MOV     #6,-(SP)
10819 036572  010600                        MOV     SP,R0                 ; SP,*
10820 036574  104414                        TRAP    14
10821 036576  012702  000001        3$:     MOV     #1,R2                 ; *,DODU.FLG                     5629
10822 036602  062706  000016                ADD     #16,SP                ;                                5626
10823 036606  132777  000001  154420  4$:   BITB    #1,@ML.REG+60         ;                                5632
10824 036614  001426                        BEQ     5$
10825 036616  104455                        TRAP    55                    ;                                5635
10826 036620  000045                        .WORD   45
10827 036622  010464                        .WORD   ASYNC
10828 036624  024060                        .WORD   DUMPER
10829 036626  012746  006506                MOV     #WRD.19,-(SP)         ;                                5636
10830 036632  012746  010004                MOV     #FNC.6,-(SP)
10831 036636  012746  006426                MOV     #WRD.12,-(SP)
10832 036642  012746  007472                MOV     #PHR.5,-(SP)
10833 036646  012746  006314                MOV     #WRD.3,-(SP)
10834 036652  012746  006062                MOV     #FIV.FMT,-(SP)
10835 036656  012746  000006                MOV     #6,-(SP)
10836 036662  010600                        MOV     SP,R0                 ; SP,*
10837                             ;ML4                                                14-May-1981 13:48:54  TOPS
10838                             ;                                                   14-May-1981 13:05:08  PA:<
10839
10840 036664  104414                        TRAP    14
10841 036666  062706  000016                ADD     #16,SP                ;                                5634
10842 036672  032777  020000  154334  5$:   BIT     #20000,@ML.REG+60     ;                                5639
10843 036700  001426                        BEQ     6$
10844 036702  104455                        TRAP    55                    ;                                5642
10845 036704  000046                        .WORD   46
10846 036706  010464                        .WORD   ASYNC
10847 036710  024060                        .WORD   DUMPER
10848 036712  012746  006506                MOV     #WRD.19,-(SP)         ;                                5643
10849 036716  012746  010004                MOV     #FNC.6,-(SP)
10850 036722  012746  006426                MOV     #WRD.12,-(SP)
```

```
10851 036726  012746  007472                    MOV     #PHR.5,-(SP)
10852 036732  012746  006322                    MOV     #WRD.4,-(SP)
10853 036736  012746  006062                    MOV     #FIV.FMT,-(SP)
10854 036742  012746  000006                    MOV     #6,-(SP)
10855 036746  010600                            MOV     SP,R0                   ; SP,*
10856 036750  104414                            TRAP    14
10857 036752  062706  000016                    ADD     #16,SP                  ;                                       5641
10858 036756  012700  000050            6$:     MOV     #50,R0                  ; *,$$TMP2                              5646
10859 036762  001410            7$:     BEQ     10$
10860 036764  016701  143126                    MOV     L$DLY,R1                ; *,$$TMP1
10861 036770  001403                            BEQ     9$
10862 036772  005016            8$:     CLR     (SP)                    ; $$TMP
10863 036774  005301                            DEC     R1                      ; $$TMP1
10864 036776  001375                            BNE     8$
10865 037000  005300            9$:     DEC     R0                      ; $$TMP2
10866 037002  000767                            BR      7$
10867 037004  132777  000200  154212    10$:    BITB    #200,@ML.REG+50         ;                                       5648
10868 037012  001106                            BNE     15$
10869 037014  132777  000001  154132            BITB    #1,@ML.REG              ;                                       5652
10870 037022  001452                            BEQ     13$
10871 037024  152777  000040  154162            BISB    #40,@ML.REG+40          ;                                       5654
10872 037032  016701  154544                    MOV     ML.DUT,R1
10873 037036  042701  177770                    BIC     #177770,R1
10874 037042  142777  000007  154144            BICB    #7,@ML.REG+40
10875 037050  150177  154140                    BISB    R1,@ML.REG+40
10876 037054  132777  000001  154072            BITB    #1,@ML.REG              ;                                       5657
10877 037062  001405                            BEQ     11$
10878 037064  104455                            TRAP    55
10879 037066  000047                            .WORD   47
10880 037070  010464                            .WORD   ASYNC
10881 037072  024060                            .WORD   DUMPER
10882 037074  000404                            BR      12$
10883 037076  104455            11$:    TRAP    55
10884 037100  000050                            .WORD   50
10885 037102  010526                            .WORD   SYNC
10886 037104  024060                            .WORD   DUMPER
10887 037106  012746  006506    12$:    MOV     #WRD.19,-(SP)           ;                                       5660
10888 037112  012746  010004                    MOV     #FNC.6,-(SP)
10889 037116  012746  006416                    MOV     #WRD.11,-(SP)
10890 037122  012746  007404                    MOV     #PHR.2,-(SP)
10891 037126  012746  006276                    MOV     #WRD.1,-(SP)
10892                         ;ML4                                                    14-May-1981 13:48:54    TOPS
10893                         ;                                                       14-May-1981 13:05:08    PA:<
10894
10895 037132  012746  006062                    MOV     #FIV.FMT,-(SP)
10896 037136  012746  000006                    MOV     #6,-(SP)
10897 037142  010600                            MOV     SP,R0                   ; SP,*
10898 037144  104414                            TRAP    14
10899 037146  000424                            BR      14$                     ;                                       5652
10900 037150  104455            13$:    TRAP    55                      ;                                       5664
10901 037152  000051                            .WORD   51
10902 037154  010464                            .WORD   ASYNC
10903 037156  024060                            .WORD   DUMPER
10904 037160  012746  006506                    MOV     #WRD.19,-(SP)           ;                                       5665
10905 037164  012746  010004                    MOV     #FNC.6,-(SP)
10906 037170  012746  006416                    MOV     #WRD.11,-(SP)
10907 037174  012746  007366                    MOV     #PHR.1,-(SP)
```

```
10908 037200  012746  006302                MOV     #WRD.2,-(SP)
10909 037204  012746  006062                MOV     #FIV.FMT,-(SP)
10910 037210  012746  000006                MOV     #6,-(SP)
10911 037214  010600                        MOV     SP,R0                   ; SP,*
10912 037216  104414                        TRAP    14
10913 037220  012702  000001          14$:  MOV     #1,R2                   ; *,DODU.FLG                    5668
10914 037224  062706  000016                ADD     #16,SP                  ;                               5650
10915 037230  132777  000001  153716  15$:  BITB    #1,@ML.REG              ;                               5671
10916 037236  001455                        BEQ     18$
10917 037240  152777  000040  153746        BISB    #40,@ML.REG+40          ;                               5673
10918 037246  016701  154330                MOV     ML.DUT,R1
10919 037252  042701  177770                BIC     #177770,R1
10920 037256  142777  000007  153730        BICB    #7,@ML.REG+40
10921 037264  150177  153724                BISB    R1,@ML.REG+40
10922 037270  132777  000001  153656        BITB    #1,@ML.REG              ;                               5676
10923 037276  001405                        BEQ     16$
10924 037300  104455                        TRAP    55
10925 037302  000052                        .WORD   52
10926 037304  010464                        .WORD   ASYNC
10927 037306  024060                        .WORD   DUMPER
10928 037310  000404                        BR      17$
10929 037312  104455          16$:  TRAP    55
10930 037314  000053                        .WORD   53
10931 037316  010526                        .WORD   SYNC
10932 037320  024060                        .WORD   DUMPER
10933 037322  012746  006506          17$:  MOV     #WRD.19,-(SP)           ;                               5679
10934 037326  012746  010004                MOV     #FNC.6,-(SP)
10935 037332  012746  006416                MOV     #WRD.11,-(SP)
10936 037336  012746  007404                MOV     #PHR.2,-(SP)
10937 037342  012746  006276                MOV     #WRD.1,-(SP)
10938 037346  012746  006062                MOV     #FIV.FMT,-(SP)
10939 037352  012746  000006                MOV     #6,-(SP)
10940 037356  010600                        MOV     SP,R0                   ; SP,*
10941 037360  104414                        TRAP    14
10942 037362  012702  000001                MOV     #1,R2                   ; *,DODU.FLG                    5680
10943 037366  062706  000016                ADD     #16,SP                  ;                               5673
10944 037372  104467          18$:  TRAP    67                              ;                               5681
10945 037374  006000                        ROR     R0
10946 037376  103002                        BHIS    19$
10947                       ;ML4                                                    14-May-1981 13:48:54    TOPS
10948                       ;                                                       14-May-1981 13:05:08    PA:<
10949
10950 037400  000167  176700                JMP     1$
10951 037404  032777  040000  153542  19$:  BIT     #40000,@ML.REG          ;                               5685
10952 037412  001432                        BEQ     20$
10953 037414  104455                        TRAP    55                      ;                               5688
10954 037416  000164                        .WORD   164
10955 037420  010672                        .WORD   INTER
10956 037422  024060                        .WORD   DUMPER
10957 037424  012746  006506                MOV     #WRD.19,-(SP)           ;                               5689
10958 037430  012746  010004                MOV     #FNC.6,-(SP)
10959 037434  012746  006426                MOV     #WRD.12,-(SP)
10960 037440  012746  007472                MOV     #PHR.5,-(SP)
10961 037444  012746  006514                MOV     #WRD.20,-(SP)
10962 037450  012746  007174                MOV     #WRD.61,-(SP)
10963 037454  012746  006100                MOV     #SIX.FMT,-(SP)
10964 037460  012746  000007                MOV     #7,-(SP)
```

```
10965 037464  010600                    MOV     SP,R0                           ; SP,*
10966 037466  104414                    TRAP    14
10967 037470  012702  000001            MOV     #1,R2                           ; *,DODU.FLG                    5690
10968 037474  062706  000020            ADD     #20,SP                          ;                               5687
10969 037500  005302              20$:  DEC     R2                              ; DODU.FLG                      5693
10970 037502  001004                    BNE     21$
10971 037504  016700  154070            MOV     ML.LUN,R0                       ;                               5696
10972 037510  104451                    TRAP    51
10973 037512  104444                    TRAP    44
10974 037514  005726              21$:  TST     (SP)+                           ;                               5573
10975 037516  000207                    RTS     PC
10976
10977                           ; Routine Size:  329 words
10978                           ; Maximum stack depth per invocation:  18 words
10983
10984
10988
10989                                   .SBTTL  T15
10993 037520                    T15::
10994 037520  004767  176552    1$:     JSR     PC,$T15                         ;                               5698
10995 037524  104466                    TRAP    66
10996 037526  006000                    ROR     R0
10997 037530  103773                    BLO     1$
10998 037532  000207                    RTS     PC
10999
11000                           ; Routine Size:  6 words
11001                           ; Maximum stack depth per invocation:  0 words
11002                           ;ML4                                    14-May-1981 13:48:54    TOPS
11003                           ;                                       14-May-1981 13:05:08    PA:<
11004
11009
11010
11011 ;           5701  !<BLF/PAGE>
```

```
11013 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
11014 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (66)
11015
11016 ;          5702  !
11017 ;          5703  BGNTST;
11018 ;          5704
11019 ;          5705  !++
11020 ;          5706  ! TEST NUMBER:  TST 16
11021 ;          5707  !
11022 ;          5708  ! TEST NAME:    CLEAR FUNCTION TEST
11023 ;          5709  !
11024 ;          5710  ! TEST DESCRIPTION:
11025 ;          5711  !       TEST IF THE DRIVE CAN PERFORM A CLEAR FUNCTION WITHOUT HANGING THE DRIVE.
11026 ;          5712  !
11027 ;          5713  !       A CLEAR FUNCTION IS WRITTEN INTO MLCS1.
11028 ;          5714  !
11029 ;          5715  !       THEN GO AND ERROR BITS ARE CHECKED FOR CORRECT STATUS.
11030 ;          5716  !       THIS DRIVE IS DROPPED ON DETECTED ERRORS.
11031 ;          5717  !
11032 ;          5718  !--
11033 ;          5719
11034 ;          5720  local
11035 ;          5721      DODU_FLG;                                   !DROP UNIT FLAG
11036 ;          5722
11037 ;          5723  BGNSUB;
11038 ;          5724  CLR_MBUS;
11039 ;          5725  DODU_FLG = ZERO;
11040 ;          5726  MLER = ONES;                                    !SET BITS IN ERROR REGISTER
11041 ;          5727  MLCS1 = DRV_CLR;                                !DO A CLEAR FUNCTION
11042 ;          5728  DELAY (ONE_US);                                 !DELAY
11043 ;          5729
11044 ;          5730  if .GO IS_SET                                   !SEE IF GO CLEARED AFTER FUNCTION
11045 ;          5731  then
11046 ;          5732      begin                                       !ERROR IF SET
11047 ;          5733      ERRDF (44, ASYNC, DUMPER);
11048 ;          5734      PRINTB (FIV_FMT, WRD_1, PHR_5, WRD_11, FNC_3, FNC_7, WRD_19);
11049 ;          5735
11050 ;          5736      if .DRY IS_SET                              !TST DRY CLEAR WITH GO SET
11051 ;          5737      then
11052 ;          5738          begin                                   !ERROR IF SET
11053 ;          5739          ERRDF (45, ASYNC, DUMPER);
11054 ;          5740          PRINTB (FIV_FMT, WRD_2, PHR_5, WRD_43, WRD_1, PHR_5);
11055 ;          5741          end;
11056 ;          5742
11057 ;          5743      DODU_FLG = ONE;                             !SET DODU_FLG
11058 ;          5744      end
11059 ;          5745  else                                            !GO CLEARED AFTER FUNCTION
11060 ;          5746
11061 ;          5747      if .DRY IS_NOT_SET                          !TST DRY SET WITH GO CLEAR
11062 ;          5748      then
11063 ;          5749          begin                                   !ERROR IF NOT SET
11064 ;          5750          ERRDF (46, ASYNC, DUMPER);
11065 ;          5751          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
11066 ;          5752          DODU_FLG = ONE;
11067 ;          5753          end;
```

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11069 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
11070 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (66)
11071
11072 ;          5754
11073 ;          5755  if .ILF IS_SET                                !DID FUNCTION CAUSE ILF
11074 ;          5756  then
11075 ;          5757      begin                                     !ERROR IF YES
11076 ;          5758      ERRDF (47, ASYNC, DUMPER);
11077 ;          5759      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_3, FNC_7, WRD_19);
11078 ;          5760      end;
11079 ;          5761
11080 ;          5762  if .OPI IS_SET                                !DID FUNCTION CAUSE OPI
11081 ;          5763  then
11082 ;          5764      begin                                     !ERROR IF YES
11083 ;          5765      ERRDF (48, ASYNC, DUMPER);
11084 ;          5766      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_3, FNC_7, WRD_19);
11085 ;          5767      end;
11086 ;          5768
11087 ;          5769  if .MLER neq ZERO                             !TEST ERROR REGISTER FOR CLEAR
11088 ;          5770  then
11089 ;          5771      begin                                     !ERROR IF NOT CLEAR
11090 ;          5772      ERRDF (49, ASYNC, DUMPER);
11091 ;          5773      PRINTB (SIX_FMT, FNC_3, FNC_7, WRD_19, WRD_14, WRD_13, REG_3);
11092 ;          5774      end;
11093 ;          5775
11094 ;          5776  ENDSUB;
11095 ;          5777
11096 ;          5778  if .DODU_FLG IS_SET                           !DROP THIS UNIT IF DODU_FLG SET
11097 ;          5779  then
11098 ;          5780      begin
11099 ;          5781      DODU (.ML_LUN);
11100 ;          5782      DOCLN;
11101 ;          5783      end;
11102 ;          5784
11103 ;          5785  ENDTST;
11107
11108                                        .SBTTL  $T16
11112 037534  004167  144304          $T16: JSR     R1,$SAVE2                 ;                          5700
11113 037540  005746                        TST     -(SP)
11114 037542  104402                  1$:   TRAP    2                         ;                          5721
11115 037544  152777  000040  153442        BISB    #40,@ML.REG+40            ;                          5723
11116 037552  016701  154024              MOV     ML.DUT,R1
11117 037556  042701  177770              BIC     #177770,R1
11118 037562  142777  000007  153424        BICB    #7,@ML.REG+40
11119 037570  150177  153420              BISB    R1,@ML.REG+40
11120 037574  005002                      CLR     R2                        ; DODU.FLG                 5725
11121 037576  012777  177777  153430        MOV     #-1,@ML.REG+60            ;                          5726
11122 037604  012777  000011  153342        MOV     #11,@ML.REG               ;                          5727
11123 037612  012700  000001              MOV     #1,R0                     ; *,$$TMP2                 5728
```

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                                                                                                14-May-1981 13:48:54    TOPS
                                                                                                14-May-1981 13:05:08    PA:<
11125                           ;ML4
11126                           ;
11127
11128 037616  001410                  2$:     BEQ     5$
11129 037620  016701  142272                  MOV     L$DLY,R1                ; *,$$TMP1
11130 037624  001403                  3$:     BEQ     4$
11131 037626  005016                          CLR     (SP)                    ; $$TMP
11132 037630  005301                          DEC     R1                      ; $$TMP1
11133 037632  001375                          BNE     3$
11134 037634  005300                  4$:     DEC     R0                      ; $$TMP2
11135 037636  000767                          BR      2$
11136 037640  132777  000001  153306  5$:     BITB    #1,@ML.REG              ;                                       5730
11137 037646  001464                          BEQ     7$
11138 037650  104455                          TRAP    55                      ;                                       5733
11139 037652  000054                          .WORD   54
11140 037654  010464                          .WORD   ASYNC
11141 037656  024060                          .WORD   DUMPER
11142 037660  012746  006506                  MOV     #WRD.19,-(SP)           ;                                       5734
11143 037664  012746  010012                  MOV     #FNC.7,-(SP)
11144 037670  012746  007750                  MOV     #FNC.3,-(SP)
11145 037674  012746  006416                  MOV     #WRD.11,-(SP)
11146 037700  012746  007472                  MOV     #PHR.5,-(SP)
11147 037704  012746  006276                  MOV     #WRD.1,-(SP)
11148 037710  012746  006062                  MOV     #FIV.FMT,-(SP)
11149 037714  012746  000007                  MOV     #7,-(SP)
11150 037720  010600                          MOV     SP,R0                   ; SP,*
11151 037722  104414                          TRAP    14
11152 037724  105777  153274                  TSTB    @ML.REG+50              ;                                       5736
11153 037730  100026                          BPL     6$
11154 037732  104455                          TRAP    55                      ;                                       5739
11155 037734  000055                          .WORD   55
11156 037736  010464                          .WORD   ASYNC
11157 037740  024060                          .WORD   DUMPER
11158 037742  012746  007472                  MOV     #PHR.5,-(SP)            ;                                       5740
11159 037746  012746  006276                  MOV     #WRD.1,-(SP)
11160 037752  012746  006754                  MOV     #WRD.43,-(SP)
11161 037756  012746  007472                  MOV     #PHR.5,-(SP)
11162 037762  012746  006302                  MOV     #WRD.2,-(SP)
11163 037766  012746  006062                  MOV     #FIV.FMT,-(SP)
11164 037772  012746  000006                  MOV     #6,-(SP)
11165 037776  010600                          MOV     SP,R0                   ; SP,*
11166 040000  104414                          TRAP    14
11167 040002  062706  000016                  ADD     #16,SP                  ;                                       5738
11168 040006  012702  000001          6$:     MOV     #1,R2                   ; *,DODU.FLG                            5743
11169 040012  062706  000020                  ADD     #20,SP                  ;                                       5732
11170 040016  000434                          BR      8$                      ;                                       5730
11171 040020  132777  000200  153176  7$:     BITB    #200,@ML.REG+50         ;                                       5747
11172 040026  001030                          BNE     8$
11173 040030  104455                          TRAP    55                      ;                                       5750
11174 040032  000056                          .WORD   56
11175 040034  010464                          .WORD   ASYNC
11176 040036  024060                          .WORD   DUMPER
11177 040040  012746  007504                  MOV     #PHR.6,-(SP)            ;                                       5751
11178 040044  012746  006276                  MOV     #WRD.1,-(SP)
11179 040050  012746  006754                  MOV     #WRD.43,-(SP)
```

```
11181                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
11182                                   ;                                                       14-May-1981 13:05:08    PA:<
11183
11184 040054  012746  007366                      MOV     #PHR.1,-(SP)
11185 040060  012746  006302                      MOV     #WRD.2,-(SP)
11186 040064  012746  006062                      MOV     #FIV.FMT,-(SP)
11187 040070  012746  000006                      MOV     #6,-(SP)
11188 040074  010600                             MOV     SP,R0                           ; SP,*
11189 040076  104414                             TRAP    14
11190 040100  012702  000001                      MOV     #1,R2                           ; *,DODU.FLG                            5752
11191 040104  062706  000016                      ADD     #16,SP                          ;                                       5749
11192 040110  132777  000001  153116  8$:        BITB    #1,@ML.REG+60                   ;                                       5755
11193 040116  001430                             BEQ     9$
11194 040120  104455                             TRAP    55                              ;                                       5758
11195 040122  000057                             .WORD   57
11196 040124  010464                             .WORD   ASYNC
11197 040126  024060                             .WORD   DUMPER
11198 040130  012746  006506                      MOV     #WRD.19,-(SP)                   ;                                       5759
11199 040134  012746  010012                      MOV     #FNC.7,-(SP)
11200 040140  012746  007750                      MOV     #FNC.3,-(SP)
11201 040144  012746  006426                      MOV     #WRD.12,-(SP)
11202 040150  012746  007472                      MOV     #PHR.5,-(SP)
11203 040154  012746  006314                      MOV     #WRD.3,-(SP)
11204 040160  012746  006062                      MOV     #FIV.FMT,-(SP)
11205 040164  012746  000007                      MOV     #7,-(SP)
11206 040170  010600                             MOV     SP,R0                           ; SP,*
11207 040172  104414                             TRAP    14
11208 040174  062706  000020                      ADD     #20,SP                          ;                                       5757
11209 040200  032777  020000  153026  9$:        BIT     #20000,@ML.REG+60               ;                                       5762
11210 040206  001430                             BEQ     10$
11211 040210  104455                             TRAP    55                              ;                                       5765
11212 040212  000060                             .WORD   60
11213 040214  010464                             .WORD   ASYNC
11214 040216  024060                             .WORD   DUMPER
11215 040220  012746  006506                      MOV     #WRD.19,-(SP)                   ;                                       5766
11216 040224  012746  010012                      MOV     #FNC.7,-(SP)
11217 040230  012746  007750                      MOV     #FNC.3,-(SP)
11218 040234  012746  006426                      MOV     #WRD.12,-(SP)
11219 040240  012746  007472                      MOV     #PHR.5,-(SP)
11220 040244  012746  006322                      MOV     #WRD.4,-(SP)
11221 040250  012746  006062                      MOV     #FIV.FMT,-(SP)
11222 040254  012746  000007                      MOV     #7,-(SP)
11223 040260  010600                             MOV     SP,R0                           ; SP,*
11224 040262  104414                             TRAP    14
11225 040264  062706  000020                      ADD     #20,SP                          ;                                       5764
11226 040270  005777  152740        10$:         TST     @ML.REG+60                      ;                                       5769
11227 040274  001430                             BEQ     11$
11228 040276  104455                             TRAP    55                              ;                                       5772
11229 040300  000061                             .WORD   61
11230 040302  010464                             .WORD   ASYNC
11231 040304  024060                             .WORD   DUMPER
11232 040306  012746  010274                      MOV     #REG.3,-(SP)                    ;                                       5773
11233 040312  012746  006436                      MOV     #WRD.13,-(SP)
11234 040316  012746  006442                      MOV     #WRD.14,-(SP)
11235 040322  012746  006506                      MOV     #WRD.19,-(SP)
```

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                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                        MOV     #FNC.7,-(SP)
                                        MOV     #FNC.3,-(SP)
                                        MOV     #SIX.FMT,-(SP)
                                        MOV     #7,-(SP)
                                        MOV     SP,R0                           ; SP,*
                                        TRAP    14
                                        ADD     #20,SP                          ;                                       5771
                                11$:    TRAP    67                              ;                                       5774
                                        ROR     R0
                                        BHIS    12$
                                        JMP     1$
                                12$:    DEC     R2                              ; DODU.FLG                              5778
                                        BNE     13$
                                        MOV     ML.LUN,R0                       ;                                       5781
                                        TRAP    51
                                        TRAP    44
                                13$:    TST     (SP)+                           ;                                       5700
                                        RTS     PC

                                ; Routine Size:  214 words
                                ; Maximum stack depth per invocation:  19 words


                                        .SBTTL  T16
                                T16::
                                1$:     JSR     PC,$T16                         ;                                       5783
                                        TRAP    66
                                        ROR     R0
                                        BLO     1$
                                        RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


                        5786    !<BLF/PAGE>
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11292 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
11293 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (67)
11294
11295 ;          5787  !
11296 ;          5788  BGNTST
11297 ;          5789
11298 ;          5790  !++
11299 ;          5791  ! TEST NUMBER:  TST 17
11300 ;          5792  !
11301 ;          5793  ! TEST NAME: DIAGNOSTIC REGISTER TESTS
11302 ;          5794  !
11303 ;          5795  ! TEST DESCRIPTION:
11304 ;          5796  !       TEST THE DATA DIAG REGISTERS MLD1, MLD2, MLE2
11305 ;          5797  !       FOR 1'S/0'S, SHIFTING 1'S/0'S AND INITIALIZATION
11306 ;          5798  !
11307 ;          5799  !--
11308 ;          5800
11309 ;          5801  local
11310 ;          5802  CLR_DATA ,                                  !CLEAR DATA FOR INIT TEST
11311 ;          5803  SAVE ,                                      !TEMPORARY SAVE LOCATION
11312 ;          5804  ERR_FLG ,                                   !ERROR FLAG
11313 ;          5805  TST_PAT ,                                   !TEST PATTERN
11314 ;          5806  index ,                                     !POINTS TO REGISTER PRESENTLY BEING TESTED
11315 ;          5807  DODU_FLG;                                   !DROP UNIT FLAG
11316 ;          5808  DODU_FLG = ZERO;
11317 ;          5809  !
11318 ;          5810  !
11319 ;          5811  !       FIRST TEST THE REGISTERS FOR ONES AND ZEROES
11320 ;          5812  !
11321 ;          5813  !
11322 ;          5814  TST_PAT = ONES;                             !LOAD TEST PAT WITH ONES
11323 ;          5815
11324 ;          5816  incr TWICE from 0 to 1 do                  !REPEAT LOOP TWICE
11325 ;          5817      begin
11326 ;          5818
11327 ;          5819      incr REG_SEL from 11 to 13 do           !TEST ELEVEN WRITE/READ REGISTERS
11328 ;          5820          begin
11329 ;          5821          BGNSUB;
11330 ;          5822          CLR_MBUS;
11331 ;          5823          WRT_REG (.TST_PAT, .REG_SEL, index);    !WRITE TO THE REGISTER
11332 ;          5824          RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);   !READ THE REGISTER
11333 ;          5825
11334 ;          5826          if .ERR_FLG IS_SET                      !SEE IF READ FOUND AN ERROR
11335 ;          5827          then
11336 ;          5828              begin                               !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
11337 ;          5829              ERRDF (121, ARR_DAT, DUMPER);       !ARRAY DATA MODULE FAILURE
11338 ;          5830              PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
11339 ;          5831              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
11340 ;          5832              DODU_FLG = ONE;
11341 ;          5833              end;
11342 ;          5834
11343 ;          5835          ENDSUB;
11344 ;          5836          end;
11345 ;          5837
11346 ;          5838      TST_PAT = not .TST_PAT;                 !REPEAT AGAIN WITH COMPLIMENT DATA
11347 ;ML4                                                         14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
11348 ;                                                           14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (67)
```

```
11349
11350 ;          5839      end;
11351 ;          5840
11352 ;          5841  !
11353 ;          5842  !
11354 ;          5843  !       TEST THE REGISTERS FOR SHIFTING ONES AND ZEROES
11355 ;          5844  !
11356 ;          5845  !
11357 ;          5846  TST_PAT = ONE;                          !LOAD TST_PAT WITH A 1 IN A FILED OF 0'S
11358 ;          5847
11359 ;          5848  incr SHIFT from 0 to 15 do              !DO SHIFT 16 TIMES
11360 ;          5849      begin
11361 ;          5850
11362 ;          5851      incr TWICE from 0 to 1 do           !REPEAT LOOP TWICE
11363 ;          5852          begin
11364 ;          5853
11365 ;          5854          incr REG_SEL from 11 to 13 do   !TEST ELEVEN READ/WRITE REGISTERS
11366 ;          5855              begin
11367 ;          5856              BGNSUB;
11368 ;          5857              CLR_MBUS;
11369 ;          5858              WRT_REG (.TST_PAT, .REG_SEL, index);      !WRITE TO THE REGISTER
11370 ;          5859              RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);     !READ THE REGISTER
11371 ;          5860
11372 ;          5861              if .ERR_FLG IS_SET                !SEE IF THE READ FOUND AN ERROR
11373 ;          5862              then
11374 ;          5863                  begin                         !IF THE ERROR FLAG IS SET THEN ERROR
11375 ;          5864                  ERRDF (122, ARR_DAT, DUMPER); !ARRAY DATA MODULE FAILURE
11376 ;          5865                  PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
11377 ;          5866                  PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
11378 ;          5867                  DODU_FLG = ONE;
11379 ;          5868                  end;
11380 ;          5869
11381 ;          5870              ENDSUB;
11382 ;          5871              end;
11383 ;          5872
11384 ;          5873          TST_PAT = not .TST_PAT;           !REPEAT WITH A 0 IN A FIELD OF 1'S
11385 ;          5874          end;
11386 ;          5875
11387 ;          5876      TST_PAT = .TST_PAT^ONE;               !SHIFT THE 1 IN THE FIELD OF 0'S
11388 ;          5877      end;
11389 ;          5878
11390 ;          5879  !
11391 ;          5880  !
11392 ;          5881  !       NOW TEST THE REGISTERS FOR INITIALIZATION
11393 ;          5882  !
11394 ;          5883  !
11395 ;          5884  REG_INIT_FLG = ONE;
11396 ;          5885  TST_PAT = ONES;                          !BACKGROUND PATTERN
11397 ;          5886
11398 ;          5887  incr TWICE from 0 to 1 do               !REPEAT LOOP TWICE
11399 ;          5888      begin
11400 ;          5889
11401 ;          5890      incr REG_SEL from 11 to 13 do       !TEST THIRTEEN REGISTERS
11402 ;ML4                                                     14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
11403 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (67)
11404
11405 ;          5891          begin
```

```
11406 :          5892          BGNSUB;
11407 :          5893          CLR_MBUS;
11408 :          5894          WRT_REG (.TST_PAT, .REG_SEL, index);  !WRITE REGISTER WITH BACKGROUND
11409 :          5895          CLR_DATA = (.HI) or (.IGNORE);        !CALCULATE THE CLEARED DATA PATTERN
11410 :          5896          REG_INIT_FLG = ONE;
11411 :          5897          RD_REG (.CLR_DATA, .REG_SEL, ERR_FLG);  !READ THE REGISTER FOR THE CLEARED DATA PAT
11412 :          5898
11413 :          5899          if .ERR_FLG IS_SET                    !SEE IF READ FOUND AN ERROR
11414 :          5900          then
11415 :          5901              begin                             !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
11416 :          5902              ERRDF (118, ARR_DAT, DUMPER);     !ARRAY DATA MODULE
11417 :          5903              PRINTB (FIV_FMT, PHR_4, WRD_12, WRD_52, FNC_23, WRD_56);
11418 :          5904              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .CLR_DATA, .RD_DATA);
11419 :          5905              DODU_FLG = ONE;
11420 :          5906              end;
11421 :          5907
11422 :          5908          ENDSUB;
11423 :          5909          end;
11424 :          5910
11425 :          5911      TST_PAT = not .TST_PAT;                   !REPEAT WITH COMPLIMENT BACKGROUND PAT
11426 :          5912      end;
11427 :          5913
11428 :          5914  REG_INIT_FLG = ZERO;                          !CLEAR THE FLAG
11429 :          5915
11430 :          5916  if .DODU_FLG IS_SET                           !DROP THIS UNIT IF DODU_FLG SET
11431 :          5917  then
11432 :          5918      begin
11433 :          5919      DODU (.ML_LUN);
11434 :          5920      DOCLN;
11435 :          5921      end;
11436 :          5922
11437 :          5923  ENDTST;
11441
11442                                  .SBTTL  $T17
11446 040424 004167 143466       $T17:  JSR     R1,$SAVE5              ;                                  5785
11447 040430 024646                     CMP     -(SP),-(SP)
11448 040432 005046                     CLR     -(SP)                  ; DODU.FLG                         5808
11449 040434 012703 177777              MOV     #-1,R3                 ; *,TST.PAT                        5814
11450 040440 005001                     CLR     R1                     ; TWICE                            5816
11451 040442 012702 000013       1$:    MOV     #13,R2                 ; *,REG.SEL                        5819
11452 040446 104402              2$:    TRAP    2                      ;                                  5820
11453 040450 152777 000040 152536       BISB    #40,@ML.REG+40         ;                                  5821
11454 040456 016705 153120              MOV     ML.DUT,R5
11455 040462 042705 177770              BIC     #177770,R5
11456 040466 142777 000007 152520       BICB    #7,@ML.REG+40
11457                            ;ML4                                                14-May-1981 13:48:54  TOPS
11458                            ;                                                   14-May-1981 13:05:08  PA:<
11459
11460 040474 150577 152514              BISB    R5,@ML.REG+40
11461 040500 010346                     MOV     R3,-(SP)               ; TST.PAT,*                        5823
11462 040502 010246                     MOV     R2,-(SP)               ; REG.SEL,*
11463 040504 012746 000012              MOV     #12,-(SP)
11464 040510 060616                     ADD     SP,(SP)                ; INDEX,*
11465 040512 004767 162364              JSR     PC,WRT.REG
11466 040516 010316                     MOV     R3,(SP)                ; TST.PAT,*                        5824
11467 040520 010246                     MOV     R2,-(SP)               ; REG.SEL,*
11468 040522 012746 000014              MOV     #14,-(SP)
```

```
11469 040526 060616                    ADD     SP,(SP)                 ; ERR.FLG,*
11470 040530 004767 162734             JSR     PC,RD.REG
11471 040534 026627 000014 000001      CMP     14(SP),#1               ; ERR.FLG,*                     5826
11472 040542 001054                    BNE     3$
11473 040544 104455                    TRAP    55                      ;                               5829
11474 040546 000171                    .WORD   171
11475 040550 010570                    .WORD   ARR.DAT
11476 040552 024060                    .WORD   DUMPER
11477 040554 012746 007122             MOV     #WRD.56,-(SP)           ;                               5830
11478 040560 012746 007066             MOV     #WRD.52,-(SP)
11479 040564 012746 010004             MOV     #FNC.6,-(SP)
11480 040570 012746 007774             MOV     #FNC.5,-(SP)
11481 040574 012746 006426             MOV     #WRD.12,-(SP)
11482 040600 012746 007454             MOV     #PHR.4,-(SP)
11483 040604 012746 006100             MOV     #SIX.FMT,-(SP)
11484 040610 012746 000007             MOV     #7,-(SP)
11485 040614 010600                    MOV     SP,R0                   ; SP,*
11486 040616 104414                    TRAP    14
11487 040620 016716 152304             MOV     RD.DATA,(SP)            ;                               5831
11488 040624 016746 152276             MOV     WT.DATA,-(SP)
11489 040630 016600 000040             MOV     40(SP),R0               ; INDEX,*
11490 040634 006300                    ASL     R0
11491 040636 006300                    ASL     R0
11492 040640 006300                    ASL     R0
11493 040642 016046 013154             MOV     ML.REG(R0),-(SP)
11494 040646 012746 005216             MOV     #FMT.16,-(SP)
11495 040652 012746 000004             MOV     #4,-(SP)
11496 040656 010600                    MOV     SP,R0                   ; SP,*
11497 040660 104414                    TRAP    14
11498 040662 012766 000001 000042      MOV     #1,42(SP)               ; *,DODU.FLG                    5832
11499 040670 062706 000030             ADD     #30,SP                  ;                               5828
11500 040674 062706 000012          3$:ADD     #12,SP                  ;                               5820
11501 040700 104467                    TRAP    67                      ;                               5833
11502 040702 006000                    ROR     R0
11503 040704 103660                    BLO     2$
11504 040706 005202                    INC     R2                      ; REG.SEL                       5819
11505 040710 020227 000015             CMP     R2,#15                  ; REG.SEL,*
11506 040714 003654                    BLE     2$
11507 040716 005103                    COM     R3                      ; TST.PAT                       5838
11508 040720 005201                    INC     R1                      ; TWICE                         5816
11509 040722 020127 000001             CMP     R1,#1                   ; TWICE,*
11510 040726 003645                    BLE     1$
11511 040730 012703 000001             MOV     #1,R3                   ; *,TST.PAT                     5846
11512                               ;ML4                                                14-May-1981 13:48:54  TOPS
11513                               ;                                                   14-May-1981 13:05:08  PA:<
11514
11515 040734 005004                 4$: CLR     R4                      ; SHIFT                         5848
11516 040736 005001                    CLR     R1                      ; TWICE                         5851
11517 040740 012702 000013          5$: MOV     #13,R2                  ; *,REG.SEL                     5854
11518 040744 104402                 6$: TRAP    2                       ;                               5855
11519 040746 152777 000040 152240      BISB    #40,@ML.REG+40          ;                               5856
11520 040754 016705 152622             MOV     ML.DUT,R5
11521 040760 042705 177770             BIC     #177770,R5
11522 040764 142777 000007 152222      BICB    #7,@ML.REG+40
11523 040772 150577 152216             BISB    R5,@ML.REG+40
11524 040776 010346                    MOV     R3,-(SP)                ; TST.PAT,*                     5858
11525 041000 010246                    MOV     R2,-(SP)                ; REG.SEL,*
```

```
11526 041002  012746  000012                  MOV     #12,-(SP)
11527 041006  060616                          ADD     SP,(SP)                 ; INDEX,*
11528 041010  004767  162066                  JSR     PC,WRT.REG
11529 041014  010316                          MOV     R3,(SP)                 ; TST.PAT,*                     5859
11530 041016  010246                          MOV     R2,-(SP)                ; REG.SEL,*
11531 041020  012746  000014                  MOV     #14,-(SP)
11532 041024  060616                          ADD     SP,(SP)                 ; ERR.FLG,*
11533 041026  004767  162436                  JSR     PC,RD.REG
11534 041032  026627  000014  000001          CMP     14(SP),#1               ; ERR.FLG,*                     5861
11535 041040  001054                          BNE     7$
11536 041042  104455                          TRAP    55                      ;                               5864
11537 041044  000172                          .WORD   172
11538 041046  010570                          .WORD   ARR.DAT
11539 041050  024060                          .WORD   DUMPER
11540 041052  012746  007122                  MOV     #WRD.56,-(SP)           ;                               5865
11541 041056  012746  007066                  MOV     #WRD.52,-(SP)
11542 041062  012746  010004                  MOV     #FNC.6,-(SP)
11543 041066  012746  007774                  MOV     #FNC.5,-(SP)
11544 041072  012746  006426                  MOV     #WRD.12,-(SP)
11545 041076  012746  007454                  MOV     #PHR.4,-(SP)
11546 041102  012746  006100                  MOV     #SIX.FMT,-(SP)
11547 041106  012746  000007                  MOV     #7,-(SP)
11548 041112  010600                          MOV     SP,R0                   ; SP,*
11549 041114  104414                          TRAP    14
11550 041116  016716  152006                  MOV     RD.DATA,(SP)            ;                               5866
11551 041122  016746  152000                  MOV     WT.DATA,-(SP)
11552 041126  016600  000040                  MOV     40(SP),R0               ; INDEX,*
11553 041132  006300                          ASL     R0
11554 041134  006300                          ASL     R0
11555 041136  006300                          ASL     R0
11556 041140  016046  013154                  MOV     ML.REG(R0),-(SP)
11557 041144  012746  005216                  MOV     #FMT.16,-(SP)
11558 041150  012746  000004                  MOV     #4,-(SP)
11559 041154  010600                          MOV     SP,R0                   ; SP,*
11560 041156  104414                          TRAP    14
11561 041160  012766  000001  000042          MOV     #1,42(SP)               ; *,DODU.FLG                    5867
11562 041166  062706  000030                  ADD     #30,SP                  ;                               5863
11563 041172  062706  000012          7$:     ADD     #12,SP                  ;                               5855
11564 041176  104467                          TRAP    67                      ;                               5868
11565 041200  006000                          ROR     R0
11566 041202  103660                          BLO     6$
11567                               ;ML4                                                  14-May-1981 13:48:54    TOPS
11568                               ;                                                     14-May-1981 13:05:08    PA:<
11569
11570 041204  005202                          INC     R2                      ; REG.SEL                       5854
11571 041206  020227  000015                  CMP     R2,#15                  ; REG.SEL,*
11572 041212  003654                          BLE     6$
11573 041214  005103                          COM     R3                      ; TST.PAT                       5873
11574 041216  005201                          INC     R1                      ; TWICE                         5851
11575 041220  020127  000001                  CMP     R1,#1                   ; TWICE,*
11576 041224  003645                          BLE     5$
11577 041226  006303                          ASL     R3                      ; TST.PAT                       5876
11578 041230  005204                          INC     R4                      ; SHIFT                         5848
11579 041232  020427  000017                  CMP     R4,#17                  ; SHIFT,*
11580 041236  003637                          BLE     4$
11581 041240  012767  000001  151670          MOV     #1,REG.INIT.FLG         ;                               5884
11582 041246  012703  177777                  MOV     #-1,R3                  ; *,TST.PAT                     5885
```

```
11583 041252 005004                        CLR     R4                          ; TWICE                                  5887
11584 041254 012702 000013          8$:    MOV     #13,R2                      ; *,REG.SEL                              5890
11585 041260 104402                 9$:    TRAP    2                           ;                                        5891
11586 041262 152777 000040 151724          BISB    #40,@ML.REG+40              ;                                        5892
11587 041270 016701 152306                 MOV     ML.DUT,R1
11588 041274 042701 177770                 BIC     #177770,R1
11589 041300 142777 000007 151706          BICB    #7,@ML.REG+40
11590 041306 150177 151702                 BISB    R1,@ML.REG+40
11591 041312 010346                        MOV     R3,-(SP)                    ; TST.PAT,*                              5894
11592 041314 010246                        MOV     R2,-(SP)                    ; REG.SEL,*
11593 041316 012746 000012                 MOV     #12,-(SP)
11594 041322 060616                        ADD     SP,(SP)                     ; INDEX,*
11595 041324 004767 161552                 JSR     PC,WRT.REG
11596 041330 016600 000012                 MOV     12(SP),R0                   ; INDEX,*                                5895
11597 041334 006300                        ASL     R0
11598 041336 006300                        ASL     R0
11599 041340 006300                        ASL     R0
11600 041342 010001                        MOV     R0,R1
11601 041344 016105 013156                 MOV     ML.REG+2(R1),R5             ; *,CLR.DATA
11602 041350 056105 013162                 BIS     ML.REG+6(R1),R5             ; *,CLR.DATA
11603 041354 012767 000001 151554          MOV     #1,REG.INIT.FLG             ;                                        5896
11604 041362 010516                        MOV     R5,(SP)                     ; CLR.DATA,*                             5897
11605 041366 010246                        MOV     R2,-(SP)                    ; REG.SEL,*
11606 041366 012746 000014                 MOV     #14,-(SP)
11607 041372 060616                        ADD     SP,(SP)                     ; ERR.FLG,*
11608 041374 004767 162070                 JSR     PC,RD.REG
11609 041400 026627 000014 000001          CMP     14(SP),#1                   ; ERR.FLG,*                              5899
11610 041406 001044                        BNE     10$
11611 041410 104455                        TRAP    55                          ;                                        5902
11612 041412 000166                        .WORD   166
11613 041414 010570                        .WORD   ARR.DAT
11614 041416 024060                        .WORD   DUMPER
11615 041420 012746 007122                 MOV     #WRD.56,-(SP)               ;                                        5903
11616 041424 012746 010242                 MOV     #FNC.23,-(SP)
11617 041430 012746 007066                 MOV     #WRD.52,-(SP)
11618 041434 012746 006426                 MOV     #WRD.12,-(SP)
11619 041440 012746 007454                 MOV     #PHR.4,-(SP)
11620 041444 012746 006062                 MOV     #FIV.FMT,-(SP)
11621 041450 012746 000006                 MOV     #6,-(SP)
11622                               ;ML4                                                14-May-1981 13:48:54     TOPS
11623                               ;                                                   14-May-1981 13:05:08     PA:<
11624
11625 041454 010600                        MOV     SP,R0                       ; SP,*
11626 041456 104414                        TRAP    14
11627 041460 016716 151444                 MOV     RD.DATA,(SP)                ;                                        5904
11628 041464 010546                        MOV     R5,-(SP)                    ; CLR.DATA,*
11629 041466 016146 013154                 MOV     ML.REG(R1),-(SP)
11630 041472 012746 005216                 MOV     #FMT.16,-(SP)
11631 041476 012746 000004                 MOV     #4,-(SP)
11632 041502 010600                        MOV     SP,R0                       ; SP,*
11633 041504 104414                        TRAP    14
11634 041506 012766 000001 000040          MOV     #1,40(SP)                   ; *,DODU.FLG                             5905
11635 041514 062706 000026                 ADD     #26,SP                      ;                                        5901
11636 041520 062706 000012          10$:   ADD     #12,SP                      ;                                        5891
11637 041524 104467                        TRAP    67                          ;                                        5906
11638 041526 006000                        ROR     R0
11639 041530 103653                        BLO     9$
```

```
11640 041532  005202                    INC     R2                      ; REG.SEL                       5890
11641 041534  020227  000015            CMP     R2,#15                  ; REG.SEL,*
11642 041540  003647                    BLE     9$
11643 041542  005103                    COM     R3                      ; TST.PAT                       5911
11644 041544  005204                    INC     R4                      ; TWICE                         5887
11645 041546  020427  000001            CMP     R4,#1                   ; TWICE,*
11646 041552  003640                    BLE     8$
11647 041554  005067  151356            CLR     REG.INIT.FLG            ;                               5914
11648 041560  021627  000001            CMP     (SP),#1                 ; DODU.FLG,*                    5916
11649 041564  001004                    BNE     11$
11650 041566  016700  152006            MOV     ML.LUN,R0               ;                               5919
11651 041572  104451                    TRAP    51
11652 041574  104444                    TRAP    44
11653 041576  062706  000006  11$:      ADD     #6,SP                   ;                               5785
11654 041602  000207                    RTS     PC
11655
11656                           ; Routine Size:  312 words
11657                           ; Maximum stack depth per invocation:  26 words
11662
11663
11667
11668                                   .SBTTL  T17
11672 041604                    T17::
11673 041604  004767  176614    1$:     JSR     PC,$T17                 ;                               5921
11674 041610  104466                    TRAP    66
11675 041612  006000                    ROR     R0
11676 041614  103773                    BLO     1$
11677                           ;ML4                                    14-May-1981 13:48:54    TOPS
11678                           ;                                       14-May-1981 13:05:08    PA:<
11679
11680 041616  000207                    RTS     PC
11681
11682                           ; Routine Size:  6 words
11683                           ; Maximum stack depth per invocation:  0 words
11688
11689
11690 ;          5924  !<BLF/PAGE>
```

```
11692 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
11693 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (68)
11694
11695 ;          5925  !
11696 ;          5926  !
11697 ;          5927  BGNTST;
11698 ;          5928
11699 ;          5929  !++
11700 ;          5930  ! TEST NUMBER:  TST 18
11701 ;          5931  !
11702 ;          5932  ! TEST NAME:    COMPOSIT ERROR TEST
11703 ;          5933  !
11704 ;          5934  ! TEST DESCRIPTION:
11705 ;          5935  !       TEST TO SEE IF SETTING EACH
11706 ;          5936  !       BIT IN THE ERROR REGISTER
11707 ;          5937  !       CAUSES A COMPOSIT ERROR BY:
11708 ;          5938  !
11709 ;          5939  !       WRITING A SHIFTING ONE THROUGH
11710 ;          5940  !       THE ERROR REGISTER (SKIPPING THE
11711 ;          5941  !       READ ONLY BITS) AND TESTING THE
11712 ;          5942  !       COMPOSIT ERROR BIT IN MLDS
11713 ;          5943  !       FOR BEING SET AFTER EACH
11714 ;          5944  !       WRITE.
11715 ;          5945  !
11716 ;          5946  !--
11717 ;          5947
11718 ;          5948  local
11719 ;          5949      DODU_FLG,                           !DROP UNIT FLAG
11720 ;          5950      DAT_PAT,                            !DATA PATTERN
11721 ;          5951      SKIP_MASK;                          !POINTS TO MLER READ ONLY BITS
11722 ;          5952
11723 ;          5953  CLR_MBUS;
11724 ;          5954  DODU_FLG = ZERO;
11725 ;          5955  SKIP_MASK = %o'163157';                 !LOAD SKIP MASK
11726 ;          5956  DAT_PAT = ONE;                          !DATA PATTERN SET BIT 0 IN MLER
11727 ;          5957  DODU_FLG = ZERO;
11728 ;          5958
11729 ;          5959  incr COUNT from 0 to 15 do              !WRITE AND SHIFT DATA PAT TO MLER 16 TIMES
11730 ;          5960      begin
11731 ;          5961
11732 ;          5962      if (.DAT_PAT and .SKIP_MASK) neq ZERO   !SKIP IF DAT_PAT FALLS ON READ ONLY BIT
11733 ;          5963      then
11734 ;          5964          begin
11735 ;          5965          BGNSUB;
11736 ;          5966          MLER = .DAT_PAT;                !WRITE DATA_PAT TO MLER
11737 ;          5967
11738 ;          5968          if .COMP_ERR IS_NOT_SET         !SEE IF DAT_PAT CAUSED A COMP ERROR
11739 ;          5969          then
11740 ;          5970              begin
11741 ;          5971              ERRDF (50, ASYNC, DUMPER);      !ERROR IF NO COMP ERROR
11742 ;          5972              PRINTB (FOR_FMT, FNC_8, PHR_1, WRD_12, FNC_8);
11743 ;          5973              PRINTB (FMT_4, .DAT_PAT);
11744 ;          5974              DODU_FLG = ONE;
11745 ;          5975              end;
11746 ;          5976
```

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                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (68)

11748 ;ML4
11749 ;
11750
11751 ;          5977          ENDSUB;
11752 ;          5978          end;
11753 ;          5979
11754 ;          5980      DAT_PAT = .DAT_PAT^ONE;                   !SHIFT DAT_PAT TO NEXT BIT AND REPEAT
11755 ;          5981      end;
11756 ;          5982
11757 ;          5983  if .DODU_FLG IS_SET                           !DROP UNIT IF DODU_FLG IS_SET
11758 ;          5984  then
11759 ;          5985      begin
11760 ;          5986      DODU (.ML_LUN);
11761 ;          5987      DOCLN;
11762 ;          5988      end;
11763 ;          5989
11764 ;          5990  ENDTST;
11768
11769                                        .SBTTL  $T18
11773 041620  004167  142252          $T18: JSR     R1,$SAVE4                 ;                                  5923
11774 041624  152777  000040  151362        BISB    #40,@ML.REG+40            ;                                  5951
11775 041632  016704  151744              MOV     ML.DUT,R4
11776 041636  042704  177770              BIC     #177770,R4
11777 041642  142777  000007  151344        BICB    #7,@ML.REG+40
11778 041650  150477  151340              BISB    R4,@ML.REG+40
11779 041654  005001                      CLR     R1                        ; DODU.FLG                         5954
11780 041656  012704  163157              MOV     #-14621,R4                ; *,SKIP.MASK                      5955
11781 041662  012702  000001              MOV     #1,R2                     ; *,DAT.PAT                        5956
11782 041666  005003                      CLR     R3                        ; COUNT                            5959
11783 041670  030204                1$:   BIT     R2,R4                     ; DAT.PAT,SKIP.MASK                5962
11784 041672  001447                      BEQ     4$
11785 041674  104402                2$:   TRAP    2                         ;                                  5964
11786 041676  010277  151332              MOV     R2,@ML.REG+60             ; DAT.PAT,*                        5966
11787 041702  032777  040000  151314        BIT     #40000,@ML.REG+50         ;                                  5968
11788 041710  001035                      BNE     3$
11789 041712  104455                      TRAP    55                        ;                                  5971
11790 041714  000062                      .WORD   62
11791 041716  010464                      .WORD   ASYNC
11792 041720  024060                      .WORD   DUMPER
11793 041722  012746  010022              MOV     #FNC.8,-(SP)              ;                                  5972
11794 041726  012746  006426              MOV     #WRD.12,-(SP)
11795 041732  012746  007366              MOV     #PHR.1,-(SP)
11796 041736  012746  010022              MOV     #FNC.8,-(SP)
11797 041742  012746  006046              MOV     #FOR.FMT,-(SP)
11798 041746  012746  000005              MOV     #5,-(SP)
11799 041752  010600                      MOV     SP,R0                     ; SP,*
11800 041754  104414                      TRAP    14
11801 041756  010216                      MOV     R2,(SP)                   ; DAT.PAT,*                        5973
11802 041760  012746  004400              MOV     #FMT.4,-(SP)
```

```
11804                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
11805                                   ;                                                       14-May-1981 13:05:08    PA:<
11806
11807 041764  012746  000002                    MOV     #2,-(SP)
11808 041770  010600                            MOV     SP,R0                   ; SP,*
11809 041772  104414                            TRAP    14
11810 041774  012701  000001                    MOV     #1,R1                   ; *,DODU.FLG                            5974
11811 042000  062706  000020                    ADD     #20,SP                  ;                                       5970
11812 042004  104467                    3$:     TRAP    67                      ;                                       5975
11813 042006  006000                            ROR     R0
11814 042010  103731                            BLO     2$
11815 042012  006302                    4$:     ASL     R2                      ; DAT.PAT                               5980
11816 042014  005203                            INC     R3                      ; COUNT                                 5959
11817 042016  020327  000017                    CMP     R3,#17                  ; COUNT,*
11818 042022  003722                            BLE     1$
11819 042024  005301                            DEC     R1                      ; DODU.FLG                              5983
11820 042026  001004                            BNE     5$
11821 042030  016700  151544                    MOV     ML.LUN,R0               ;                                       5986
11822 042034  104451                            TRAP    51
11823 042036  104444                            TRAP    44
11824 042040  000207                    5$:     RTS     PC                      ;                                       5923
11825
11826                                   ; Routine Size:  73 words
11827                                   ; Maximum stack depth per invocation:  13 words
11832
11833
11837
11838                                           .SBTTL  T18
11842 042042                            T18::
11843 042042  004767  177552            1$:     JSR     PC,$T18                 ;                                       5988
11844 042046  104466                            TRAP    66
11845 042050  006000                            ROR     R0
11846 042052  103773                            BLO     1$
11847 042054  000207                            RTS     PC
11848
11849                                   ; Routine Size:  6 words
11850                                   ; Maximum stack depth per invocation:  0 words
11855
11856
11857 ;          5991  !<BLF/PAGE>
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14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (69)

```
11859 ;ML4
11860 ;
11861
11862 ;          5992  !
11863 ;          5993  !
11864 ;          5994  BGNTST;
11865 ;          5995
11866 ;          5996  !++
11867 ;          5997  ! TEST NUMBER:  TST 19
11868 ;          5998  !
11869 ;          5999  ! TEST NAME:    ATA BIT TEST
11870 ;          6000  !
11871 ;          6001  ! TEST DESCRIPTION:
11872 ;          6002  !
11873 ;          6003  !       TEST THE ATA BIT FOR SETTING
11874 ;          6004  !       BY:
11875 ;          6005  !
11876 ;          6006  !       1.  SETTING A BIT IN THE ERROR
11877 ;          6007  !           REGISTER.
11878 ;          6008  !
11879 ;          6009  !           TEST THE ATA BIT FOR CLEARING
11880 ;          6010  !           AFTER BEING SET BY:
11881 ;          6011  !           1.  WRITING A FUNCTION TO MLCS1.
11882 ;          6012  !           2.  WRITING A ONE INTO THIS
11883 ;          6013  !               UNITS ATA BIT
11884 ;          6014  !
11885 ;          6015  !       TEST THE ATA BIT FOR NOT CLEARING
11886 ;          6016  !       AFTER BEING SET BY:
11887 ;          6017  !
11888 ;          6018  !       1.  WRITING A ONE INTO THE
11889 ;          6019  !           ATA BIT OF THE OTHER
11890 ;          6020  !           UNITS.
11891 ;          6021  !
11892 ;          6022  !--
11893 ;          6023
11894 ;          6024  local
11895 ;          6025      ATA_SAVE : bitvector [8],          !STORES ALL 8 ATA BITS ON READS AND WRITES
11896 ;          6026      DAT_PAT;                           !DATA PATTERN
11897 ;          6027
11898 ;          6028  CLR_MBUS;
11899 ;          6029  MLER = ONE;                            !SET THE ATA BIT
11900 ;          6030  MLER = ZERO;
11901 ;          6031  ATA_SAVE = .MLAS;                      !READ THE ATTN REGISTER
11902 ;          6032
11903 ;          6033  if .ATA_SAVE [.ML_DUT] IS_NOT_SET      !SEE IF THIS DRIVES ATA BIT IS SET
11904 ;          6034  then
11905 ;          6035      begin
11906 ;          6036      ERRDF (51, ASYNC, DUMPER);         !ERROR AND EXIT_TST IF NOT SET
11907 ;          6037      PRINTB (FOR_FMT, WRD_15, PHR_1, WRD_11, FNC_8);
11908 ;          6038      EXIT_TST;
11909 ;          6039      end;
11910 ;          6040
11911 ;          6041  if .ATTN IS_NOT_SET                    !SEE IF THE ATTN BIT IS SET
11912 ;          6042  then
11913 ;          6043      begin
```

```
11915 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
11916 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (69)
11917 ;
11918 ;          6044      ERRDF (52, ASYNC, DUMPER);                    !ERROR AND EXIT_TST IF NOT SET
11919 ;          6045      PRINTB (FIV_FMT, REG_2, WRD_16, PHR_1, WRD_11, FNC_8);
11920 ;          6046      EXIT_TST;
11921 ;          6047      end;
11922 ;          6048
11923 ;          6049  MLCS1 = NOOP;                                    !TRY TO CLEAR THE ATA BIT WITH NOOP FUNC
11924 ;          6050
11925 ;          6051  if .ATTN IS_SET                                  !SEE IF ATA GOT CLEARED
11926 ;          6052  then
11927 ;          6053      begin
11928 ;          6054      ERRDF (53, ASYNC, DUMPER);                   !ERROR AND EXIT_TST IF SET
11929 ;          6055      PRINTB (FOR_FMT, WRD_15, PHR_2, WRD_11, FNC_2, WRD_19);
11930 ;          6056      EXIT_TST;
11931 ;          6057      end;
11932 ;          6058
11933 ;          6059  ATA_SAVE = .MLAS;                               !READ THE ATTENTION REGISTER
11934 ;          6060
11935 ;          6061  if .ATA_SAVE [.ML_DUT] IS_SET                   !SEE IF THE ATA REG GOT CLEARED BY NO-OP
11936 ;          6062  then
11937 ;          6063      begin
11938 ;          6064      ERRDF (58, ASYNC, DUMPER);
11939 ;          6065      PRINTB (FIV_FMT, WRD_15, PHR_2, WRD_11, FNC_2, WRD_19);
11940 ;          6066      end;
11941 ;          6067
11942 ;          6068  BGNSUB;
11943 ;          6069  MLER = ONE;                                     !SET THE ATA BIT
11944 ;          6070  MLER = ZERO;
11945 ;          6071  ATA_SAVE = ZEROES;                              !CLEAR ATA_SAVE
11946 ;          6072  ATA_SAVE [.ML_DUT] = ONE;                       !SET ATA_SAVE FOR THIS DRIVE
11947 ;          6073  MLAS = .ATA_SAVE;                               !TRY TO CLEAR THE ATA BY WRITING TO IT.
11948 ;          6074
11949 ;          6075  if .ATTN IS_SET                                 !SEE IF THE ATA GOT CLEARED
11950 ;          6076  then
11951 ;          6077      begin
11952 ;          6078      ERRDF (54, ASYNC, DUMPER);                  !ERROR IF NOT CLEARED
11953 ;          6079      PRINTB (FIV_FMT, WRD_15, PHR_2, WRD_11, WRD_17, REG_5);
11954 ;          6080      end;
11955 ;          6081
11956 ;          6082  ENDSUB;
11957 ;          6083  BGNSUB;
11958 ;          6084  MLER = ONE;                                     !SET THE ATA BIT
11959 ;          6085  MLER = ZERO;
11960 ;          6086  DAT_PAT = ONE;                                  !DATA PATTERN OF ONE IN FIELD OF ZEROES
11961 ;          6087
11962 ;          6088  incr ATA_SEL from 0 to 7 do                     !REPEAT LOOP 8 TIMES
11963 ;          6089      begin
11964 ;          6090
11965 ;          6091      if .ATA_SEL neq .ML_DUT                     !SKIP IF ATA_SEL EQLS THIS DRIVE NO.
11966 ;          6092      then
11967 ;          6093          begin
11968 ;          6094          MLAS = .DAT_PAT;                        !WRITE DAT PAT TO ATA REGISTER
11969 ;          6095          ATA_SAVE = .MLAS;                       !READ ATA REG BACK
```

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 11971 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 11972 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (69)
 11973
 11974 ;          6096
 11975 ;          6097          if .ATA_SAVE [.ML_DUT] IS_NOT_SET       !SEE IF THIS DRIVE ATA IS CLEARED
 11976 ;          6098          then
 11977 ;          6099              begin
 11978 ;          6100              ERRDF (55, ASYNC, DUMPER);          !ERROR AND EXIT LOOP IF CLEARED
 11979 ;          6101              PRINTB (SIX_FMT, WRD_15, PHR_6, WRD_11, WRD_17, REG_5, PHR_7);
 11980 ;          6102              PRINTB (FMT_7, .DAT_PAT);
 11981 ;          6103              exitloop;
 11982 ;          6104              end;
 11983 ;          6105
 11984 ;          6106          end;
 11985 ;          6107
 11986 ;          6108      DAT_PAT = .DAT_PAT^ONE;                 !SHIFT DAT_PAT AND REPEAT
 11987 ;          6109      end;
 11988 ;          6110
 11989 ;          6111  ENDSUB;
 11990 ;          6112  ENDTST;
 11994
 11995                                        .SBTTL  $T19
 11999 042056  004167  141776          $T19:  JSR     R1,$SAVE3                ;                    5990
 12000 042062  152777  000040  151124        BISB    #40,@ML.REG+40           ;                    6026
 12001 042070  016703  151506                MOV     ML.DUT,R3
 12002 042074  042703  177770                BIC     #177770,R3
 12003 042100  142777  000007  151106        BICB    #7,@ML.REG+40
 12004 042106  150377  151102                BISB    R3,@ML.REG+40
 12005 042112  012777  000001  151114        MOV     #1,@ML.REG+60            ;                    6029
 12006 042120  005077  151110                CLR     @ML.REG+60               ;                    6030
 12007 042124  017746  151114                MOV     @ML.REG+70,-(SP)         ; *,ATA.SAVE         6031
 12008 042130  016701  151446                MOV     ML.DUT,R1                ;                    6033
 12009 042134  006201                        ASR     R1
 12010 042136  006201                        ASR     R1
 12011 042140  006201                        ASR     R1
 12012 042142  010600                        MOV     SP,R0                    ; ATA.SAVE,*
 12013 042144  060001                        ADD     R0,R1
 12014 042146  010146                        MOV     R1,-(SP)
 12015 042150  016746  151426                MOV     ML.DUT,-(SP)
 12016 042154  042716  177770                BIC     #177770,(SP)
 12017 042160  012746  000001                MOV     #1,-(SP)
 12018 042164  005046                        CLR     -(SP)
 12019 042166  004767  140746                JSR     PC,BL$GT2
 12020 042172  062706  000010                ADD     #10,SP
 12021 042176  005700                        TST     R0
 12022 042200  001026                        BNE     1$
 12023 042202  104455                        TRAP    55                       ;                    6036
 12024 042204  000063                        .WORD   63
 12025 042206  010464                        .WORD   ASYNC
```

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12027                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
12028                                   ;                                                       14-May-1981 13:05:08    PA:<
12029
12030 042210  024060                            .WORD   DUMPER
12031 042212  012746  010022                    MOV     #FNC.8,-(SP)            ;                                       6037
12032 042216  012746  006416                    MOV     #WRD.11,-(SP)
12033 042222  012746  007366                    MOV     #PHR.1,-(SP)
12034 042226  012746  006454                    MOV     #WRD.15,-(SP)
12035 042232  012746  006046                    MOV     #FOR.FMT,-(SP)
12036 042236  012746  000005                    MOV     #5,-(SP)
12037 042242  010600                            MOV     SP,R0                   ; SP,*
12038 042244  104414                            TRAP    14
12039 042246  104463                            TRAP    63
12040 042250  062706  000014                    ADD     #14,SP                  ;                                       6033
12041 042254  000467                            BR      4$                      ;                                       6035
12042 042256  032777  100000  150740  1$:       BIT     #100000,@ML.REG+50      ;                                       6041
12043 042264  001026                            BNE     2$
12044 042266  104455                            TRAP    55                      ;                                       6044
12045 042270  000064                            .WORD   64
12046 042272  010464                            .WORD   ASYNC
12047 042274  024060                            .WORD   DUMPER
12048 042276  012746  010022                    MOV     #FNC.8,-(SP)            ;                                       6045
12049 042302  012746  006416                    MOV     #WRD.11,-(SP)
12050 042306  012746  007366                    MOV     #PHR.1,-(SP)
12051 042312  012746  006462                    MOV     #WRD.16,-(SP)
12052 042316  012746  010266                    MOV     #REG.2,-(SP)
12053 042322  012746  006062                    MOV     #FIV.FMT,-(SP)
12054 042326  012746  000006                    MOV     #6,-(SP)
12055 042332  010600                            MOV     SP,R0                   ; SP,*
12056 042334  104414                            TRAP    14
12057 042336  104463                            TRAP    63
12058 042340  000433                            BR      3$                      ;                                       6041
12059 042342  012777  000001  150604  2$:       MOV     #1,@ML.REG              ;                                       6049
12060 042350  005777  150650                    TST     @ML.REG+50              ;                                       6051
12061 042354  100031                            BPL     5$
12062 042356  104455                            TRAP    55                      ;                                       6054
12063 042360  000065                            .WORD   65
12064 042362  010464                            .WORD   ASYNC
12065 042364  024060                            .WORD   DUMPER
12066 042366  012746  006506                    MOV     #WRD.19,-(SP)           ;                                       6055
12067 042372  012746  007742                    MOV     #FNC.2,-(SP)
12068 042376  012746  006416                    MOV     #WRD.11,-(SP)
12069 042402  012746  007404                    MOV     #PHR.2,-(SP)
12070 042406  012746  006454                    MOV     #WRD.15,-(SP)
12071 042412  012746  006046                    MOV     #FOR.FMT,-(SP)
12072 042416  012746  000006                    MOV     #6,-(SP)
12073 042422  010600                            MOV     SP,R0                   ; SP,*
12074 042424  104414                            TRAP    14
12075 042426  104463                            TRAP    63
12076 042430  062706  000016            3$:     ADD     #16,SP                  ;                                       6051
12077 042434  000167  000546            4$:     JMP     12$                     ;                                       6053
12078 042440  017716  150600            5$:     MOV     @ML.REG+70,(SP)         ; *,ATA.SAVE                            6059
12079 042444  016701  151132                    MOV     ML.DUT,R1               ;                                       6061
12080 042450  006201                            ASR     R1
12081 042452  006201                            ASR     R1
```

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12083                                ;ML4                                                    14-May-1981 13:48:54    TOPS
12084                                ;                                                       14-May-1981 13:05:08    PA:<
12085
12086 042454  006201                        ASR     R1
12087 042456  010600                        MOV     SP,R0                          ; ATA.SAVE,*
12088 042460  060001                        ADD     R0,R1
12089 042462  010146                        MOV     R1,-(SP)
12090 042464  016746  151112                MOV     ML.DUT,-(SP)
12091 042470  042716  177770                BIC     #177770,(SP)
12092 042474  012746  000001                MOV     #1,-(SP)
12093 042500  005046                        CLR     -(SP)
12094 042502  004767  140432                JSR     PC,BL$GT2
12095 042506  062706  000010                ADD     #10,SP
12096 042512  005300                        DEC     R0
12097 042514  001026                        BNE     6$
12098 042516  104455                        TRAP    55                             ;                6064
12099 042520  000072                        .WORD   72
12100 042522  010464                        .WORD   ASYNC
12101 042524  024060                        .WORD   DUMPER
12102 042526  012746  006506                MOV     #WRD.19,-(SP)                  ;                6065
12103 042532  012746  007742                MOV     #FNC.2,-(SP)
12104 042536  012746  006416                MOV     #WRD.11,-(SP)
12105 042542  012746  007404                MOV     #PHR.2,-(SP)
12106 042546  012746  006454                MOV     #WRD.15,-(SP)
12107 042552  012746  006062                MOV     #FIV.FMT,-(SP)
12108 042556  012746  000006                MOV     #6,-(SP)
12109 042562  010600                        MOV     SP,R0                          ; SP,*
12110 042564  104414                        TRAP    14
12111 042566  062706  000016                ADD     #16,SP                         ;                6063
12112 042572  104402                6$:     TRAP    2                              ;                6066
12113 042574  012777  000001  150432        MOV     #1,@ML.REG+60                  ;                6069
12114 042602  005077  150426                CLR     @ML.REG+60                     ;                6070
12115 042606  005016                        CLR     (SP)                           ; ATA.SAVE       6071
12116 042610  016701  150766                MOV     ML.DUT,R1                      ;                6072
12117 042614  006201                        ASR     R1
12118 042616  006201                        ASR     R1
12119 042620  006201                        ASR     R1
12120 042622  010600                        MOV     SP,R0                          ; ATA.SAVE,*
12121 042624  060001                        ADD     R0,R1
12122 042626  010146                        MOV     R1,-(SP)
12123 042630  016746  150746                MOV     ML.DUT,-(SP)
12124 042634  042716  177770                BIC     #177770,(SP)
12125 042640  012746  000001                MOV     #1,-(SP)
12126 042644  011646                        MOV     (SP),-(SP)
12127 042646  004767  140524                JSR     PC,BL$PU2
12128 042652  016677  000010  150364        MOV     10(SP),@ML.REG+70              ; ATA.SAVE,*     6073
12129 042660  005777  150340                TST     @ML.REG+50                     ;                6075
12130 042664  100026                        BPL     7$
12131 042666  104455                        TRAP    55                             ;                6078
12132 042670  000066                        .WORD   66
12133 042672  010464                        .WORD   ASYNC
12134 042674  024060                        .WORD   DUMPER
12135 042676  012746  010310                MOV     #REG.5,-(SP)                   ;                6079
12136 042702  012746  006470                MOV     #WRD.17,-(SP)
12137 042706  012746  006416                MOV     #WRD.11,-(SP)
```

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12139                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
12140                                   ;                                                       14-May-1981 13:05:08    PA:<
12141
12142 042712  012746  007404                    MOV     #PHR.2,-(SP)
12143 042716  012746  006454                    MOV     #WRD.15,-(SP)
12144 042722  012746  006062                    MOV     #FIV.FMT,-(SP)
12145 042726  012746  000006                    MOV     #6,-(SP)
12146 042732  010600                           MOV     SP,R0                   ; SP,*
12147 042734  104414                           TRAP    14
12148 042736  062706  000016                    ADD     #16,SP                  ;                                               6077
12149 042742  062706  000010            7$:     ADD     #10,SP                  ;                                               6066
12150 042746  104467                           TRAP    67                      ;                                               6080
12151 042750  006000                           ROR     R0
12152 042752  103707                           BLO     6$
12153 042754  104402                    8$:    TRAP    2                       ;                                               6082
12154 042756  012777  000001  150250          MOV     #1,@ML.REG+60           ;                                               6084
12155 042764  005077  150244                    CLR     @ML.REG+60              ;                                               6085
12156 042770  012703  000001                    MOV     #1,R3                   ; *,DAT.PAT                                     6086
12157 042774  005002                           CLR     R2                      ; ATA.SEL                                       6088
12158 042776  020267  150600            9$:    CMP     R2,ML.DUT               ; ATA.SEL,*                                     6091
12159 043002  001471                           BEQ     10$
12160 043004  010377  150234                    MOV     R3,@ML.REG+70           ; DAT.PAT,*                                     6094
12161 043010  017716  150230                    MOV     @ML.REG+70,(SP)         ; *,ATA.SAVE                                    6095
12162 043014  016701  150562                    MOV     ML.DUT,R1               ;                                               6097
12163 043020  006201                           ASR     R1
12164 043022  006201                           ASR     R1
12165 043024  006201                           ASR     R1
12166 043026  010600                           MOV     SP,R0                   ; ATA.SAVE,*
12167 043030  060001                           ADD     R0,R1
12168 043032  010146                           MOV     R1,-(SP)
12169 043034  016746  150542                    MOV     ML.DUT,-(SP)
12170 043040  042716  177770                    BIC     #177770,(SP)
12171 043044  012746  000001                    MOV     #1,-(SP)
12172 043050  005046                           CLR     -(SP)
12173 043052  004767  140062                    JSR     PC,BL$GT2
12174 043056  062706  000010                    ADD     #10,SP
12175 043062  005700                           TST     R0
12176 043064  001040                           BNE     10$
12177 043066  104455                           TRAP    55                      ;                                               6100
12178 043070  000067                           .WORD   67
12179 043072  010464                           .WORD   ASYNC
12180 043074  024060                           .WORD   DUMPER
12181 043076  012746  007516                    MOV     #PHR.7,-(SP)            ;                                               6101
12182 043102  012746  010310                    MOV     #REG.5,-(SP)
12183 043106  012746  006470                    MOV     #WRD.17,-(SP)
12184 043112  012746  006416                    MOV     #WRD.11,-(SP)
12185 043116  012746  007504                    MOV     #PHR.6,-(SP)
12186 043122  012746  006454                    MOV     #WRD.15,-(SP)
12187 043126  012746  006100                    MOV     #SIX.FMT,-(SP)
12188 043132  012746  000007                    MOV     #7,-(SP)
12189 043136  010600                           MOV     SP,R0                   ; SP,*
12190 043140  104414                           TRAP    14
12191 043142  010316                           MOV     R3,(SP)                 ; DAT.PAT,*                                     6102
12192 043144  012746  004562                    MOV     #FMT.7,-(SP)
12193 043150  012746  000002                    MOV     #2,-(SP)
```

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12195                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
12196                                   ;                                                       14-May-1981 13:05:08    PA:<
12197
12198 043154  010600                              MOV     SP,R0                   ; SP,*
12199 043156  104414                              TRAP    14
12200 043160  062706  000024                      ADD     #24,SP                  ;                                       6103
12201 043164  000405                              BR      11$
12202 043166  006303                    10$:      ASL     R3                      ; DAT.PAT                               6108
12203 043170  005202                              INC     R2                      ; ATA.SEL                               6088
12204 043172  020227  000007                      CMP     R2,#7                   ; ATA.SEL,*
12205 043176  003677                              BLE     9$
12206 043200  104467                    11$:      TRAP    67                      ;                                       6109
12207 043202  006000                              ROR     R0
12208 043204  103663                              BLO     8$
12209 043206  005726                    12$:      TST     (SP)+                   ;                                       5990
12210 043210  000207                              RTS     PC
12211
12212                                   ; Routine Size:  302 words
12213                                   ; Maximum stack depth per invocation:  16 words
12218
12219
12223
12224                                             .SBTTL  T19
12228 043212                            T19::
12229 043212  004767  176640            1$:       JSR     PC,$T19                 ;                                       6111
12230 043216  104466                              TRAP    66
12231 043220  006000                              ROR     R0
12232 043222  103773                              BLO     1$
12233 043224  000207                              RTS     PC
12234
12235                                   ; Routine Size:  6 words
12236                                   ; Maximum stack depth per invocation:  0 words
12241
12242
12243 ;               6113  !<BLF/PAGE>
```

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14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (70)

```
12245 ;ML4
12246 ;
12247
12248 ;          6114  !
12249 ;          6115  !
12250 ;          6116  BGNTST;
12251 ;          6117
12252 ;          6118  !++
12253 ;          6119  ! TEST NUMBER:  TST 20
12254 ;          6120  !
12255 ;          6121  ! TEST NAME:    SEARCH FUNCTION TEST
12256 ;          6122  !
12257 ;          6123  ! TEST DESCRIPTION:
12258 ;          6124  !
12259 ;          6125  !       TEST THE SEARCH FUNCTION BY:
12260 ;          6126  !
12261 ;          6127  !       1.  DOING A SEARCH FUNCTION AT
12262 ;          6128  !           ARRAY ZERO AND TEST GO,
12263 ;          6129  !           ERROR BITS AND ATTN FOR
12264 ;          6130  !           SETTING/NOT SETTING.
12265 ;          6131  !
12266 ;          6132  !       2.  DOING SEARCH FUNCTIONS AT ALL
12267 ;          6133  !           PRESENT ARRAYS' AND TEST ATTN
12268 ;          6134  !           SET
12269 ;          6135  !
12270 ;          6136  !       3.  DOING SEARCH FUNCTIONS AT ALL
12271 ;          6137  !           NOT PRESENT ARRAYS' AND TEST
12272 ;          6138  !           ATTN CLEARED.
12273 ;          6139  !
12274 ;          6140  !--
12275 ;          6141
12276 ;          6142  CLR_MBUS;
12277 ;          6143  MLDA = ZEROES;
12278 ;          6144  MLCS1 = SEARCH;                          !DO A SEARCH FUNCTION
12279 ;          6145
12280 ;          6146  if .GO IS_SET                            !SEE IF GO IS SET
12281 ;          6147  then
12282 ;          6148      begin
12283 ;          6149      ERRDF (56, ASYNC, DUMPER);           !ERROR IF NOT SET
12284 ;          6150      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_10, WRD_19);
12285 ;          6151      end;
12286 ;          6152
12287 ;          6153  if .ILF IS_SET                           !SEE IF ILF IS SET
12288 ;          6154  then
12289 ;          6155      begin
12290 ;          6156      ERRDF (57, ASYNC, DUMPER);           !ERROR IF SET
12291 ;          6157      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_11, FNC_10, WRD_19);
12292 ;          6158      end;
12293 ;          6159
12294 ;          6160  if .ATTN IS_NOT_SET                      !SEE IF ATTN IS SET
12295 ;          6161  then
12296 ;          6162      begin
12297 ;          6163      ERRDF (59, ASYNC, DUMPER);           !ERROR IF NOT SET
12298 ;          6164      PRINTB (FIV_FMT, WRD_16, PHR_1, WRD_12, FNC_10, WRD_19);
12299 ;          6165      end
```

```
12301 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
12302 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (70)
12303
12304 ;          6166  else
12305 ;          6167      begin
12306 ;          6168
12307 ;          6169      incr ARR_SEL from 0 to .LST_ARR by .ARR_INC do      !DO SEARCH AT ALL PRESENT ARRAYS
12308 ;          6170          begin
12309 ;          6171          BGNSUB;
12310 ;          6172          CLR_MBUS;
12311 ;          6173          MLDA = .ARR_SEL;                                !LOAD DSA REG WITH ARR_SEL
12312 ;          6174          MLCS1 = SEARCH;                                 !DO A SEARCH FUNCTION
12313 ;          6175
12314 ;          6176          if .OPI IS_SET                                  !READ ATTN
12315 ;          6177          then
12316 ;          6178              begin
12317 ;          6179              ERRDF (60, ASYNC, DUMPER);                  !ERROR IF NOT SET
12318 ;          6180              PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_10, WRD_19);
12319 ;          6181              PRINTB (FMT_9, .ARR_SEL);
12320 ;          6182              end;
12321 ;          6183
12322 ;          6184          ENDSUB;
12323 ;          6185          end;
12324 ;          6186
12325 ;          6187      if .OP_NUM_ARR lss %o'000017'                       !SEE IF LSS 17 ARRAYS ARE PRESENT
12326 ;          6188      then
12327 ;          6189
12328 ;          6190          incr ARR_SEL from .LST_ARR + .ARR_INC to .ARR_16 by .ARR_INC do
12329 ;          6191                                                          !DO A SEARCH AT ALL NOT PRESENT
12330 ;          6192              begin                                       !ARRAYS IF LSS 17
12331 ;          6193              BGNSUB;
12332 ;          6194              CLR_MBUS;
12333 ;          6195              MLDA = .ARR_SEL;                            !LOAD DSA REG WITH ARR_SEL
12334 ;          6196              MLCS1 = SEARCH;                             !DO A SEARCH FUNCTION
12335 ;          6197
12336 ;          6198              if .OPI IS_NOT_SET                          !SEE IF OPI IS SET
12337 ;          6199              then
12338 ;          6200                  begin
12339 ;          6201                  ERRDF (61, ASYNC, DUMPER);              !ERROR IF NOT SET
12340 ;          6202                  PRINTB (FIV_FMT, WRD_4, PHR_1, WRD_12, FNC_10, WRD_19);
12341 ;          6203                  PRINTB (FMT_9, .ARR_SEL);
12342 ;          6204                  end;
12343 ;          6205
12344 ;          6206              ENDSUB;
12345 ;          6207              end;
12346 ;          6208
12347 ;          6209      end;
12348 ;          6210
12349 ;          6211  ENDTST;
12353
12354                                  .SBTTL  $T20
```

```
12362 043226  004167  140626          $T20:  JSR     R1,$SAVE3                        ;                6112
12363 043232  152777  000040  147754         BISB    #40,@ML.REG+40                   ;                6116
12364 043240  016703  150336                 MOV     ML.DUT,R3
12365 043244  042703  177770                 BIC     #177770,R3
12366 043250  142777  000007  147736         BICB    #7,@ML.REG+40
12367 043256  150377  147732                 BISB    R3,@ML.REG+40
12368 043262  005077  147716                 CLR     @ML.REG+30                       ;                6143
12369 043266  012777  000031  147660         MOV     #31,@ML.REG                      ;                6144
12370 043274  132777  000001  147652         BITB    #1,@ML.REG                       ;                6146
12371 043302  001426                         BEQ     1$
12372 043304  104455                         TRAP    55                               ;                6149
12373 043306  000070                         .WORD   70
12374 043310  010464                         .WORD   ASYNC
12375 043312  024060                         .WORD   DUMPER
12376 043314  012746  006506                 MOV     #WRD.19,-(SP)                    ;                6150
12377 043320  012746  010050                 MOV     #FNC.10,-(SP)
12378 043324  012746  006416                 MOV     #WRD.11,-(SP)
12379 043330  012746  007404                 MOV     #PHR.2,-(SP)
12380 043334  012746  006276                 MOV     #WRD.1,-(SP)
12381 043340  012746  006062                 MOV     #FIV.FMT,-(SP)
12382 043344  012746  000006                 MOV     #6,-(SP)
12383 043350  010600                         MOV     SP,R0                            ; SP,*
12384 043352  104414                         TRAP    14
12385 043354  062706  000016                 ADD     #16,SP                           ;                6148
12386 043360  132777  000001  147646  1$:     BITB    #1,@ML.REG+60                    ;                6153
12387 043366  001430                         BEQ     2$
12388 043370  104455                         TRAP    55                               ;                6156
12389 043372  000071                         .WORD   71
12390 043374  010464                         .WORD   ASYNC
12391 043376  024060                         .WORD   DUMPER
12392 043400  012746  006506                 MOV     #WRD.19,-(SP)                    ;                6157
12393 043404  012746  010050                 MOV     #FNC.10,-(SP)
12394 043410  012746  010060                 MOV     #FNC.11,-(SP)
12395 043414  012746  006416                 MOV     #WRD.11,-(SP)
12396 043420  012746  007472                 MOV     #PHR.5,-(SP)
12397 043424  012746  006314                 MOV     #WRD.3,-(SP)
12398 043430  012746  006062                 MOV     #FIV.FMT,-(SP)
12399 043434  012746  000007                 MOV     #7,-(SP)
12400 043440  010600                         MOV     SP,R0                            ; SP,*
12401 043442  104414                         TRAP    14
12402 043444  062706  000020                 ADD     #20,SP                           ;                6155
12403 043450  032777  100000  147546  2$:     BIT     #100000,@ML.REG+50               ;                6160
12404 043456  001027                         BNE     3$
12405 043460  104455                         TRAP    55                               ;                6163
12406 043462  000073                         .WORD   73
12407 043464  010464                         .WORD   ASYNC
12408 043466  024060                         .WORD   DUMPER
12409 043470  012746  006506                 MOV     #WRD.19,-(SP)                    ;                6164
12410 043474  012746  010050                 MOV     #FNC.10,-(SP)
12411 043500  012746  006426                 MOV     #WRD.12,-(SP)
```

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12413                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
12414                                   ;                                                       14-May-1981 13:05:08    PA:<
12415
12416 043504  012746  007366                      MOV     #PHR.1,-(SP)
12417 043510  012746  006462                      MOV     #WRD.16,-(SP)
12418 043514  012746  006062                      MOV     #FIV.FMT,-(SP)
12419 043520  012746  000006                      MOV     #6,-(SP)
12420 043524  010600                            MOV     SP,R0                           ; SP,*
12421 043526  104414                            TRAP    14
12422 043530  062706  000016                      ADD     #16,SP                          ;                                       6162
12423 043534  000207                            RTS     PC                              ;                                       6160
12424 043536  016702  146034            3$:     MOV     LST.ARR,R2                      ;                                       6169
12425 043542  016703  146014                    MOV     ARR.INC,R3
12426 043546  005001                            CLR     R1                              ; ARR.SEL
12427 043550  000467                            BR      6$
12428 043552  104402                    4$:     TRAP    2                               ;                                       6170
12429 043554  152777  000040  147432            BISB    #40,@ML.REG+40                  ;                                       6171
12430 043562  016700  150014                    MOV     ML.DUT,R0
12431 043566  042700  177770                    BIC     #177770,R0
12432 043572  142777  000007  147414            BICB    #7,@ML.REG+40
12433 043600  150077  147410                    BISB    R0,@ML.REG+40
12434 043604  010177  147374                    MOV     R1,@ML.REG+30                   ; ARR.SEL,*                             6173
12435 043610  012777  000031  147336            MOV     #31,@ML.REG                     ;                                       6174
12436 043616  032777  020000  147410            BIT     #20000,@ML.REG+60               ;                                       6176
12437 043624  001435                            BEQ     5$
12438 043626  104455                            TRAP    55                              ;                                       6179
12439 043630  000074                            .WORD   74
12440 043632  010464                            .WORD   ASYNC
12441 043634  024060                            .WORD   DUMPER
12442 043636  012746  006506                    MOV     #WRD.19,-(SP)                   ;                                       6180
12443 043642  012746  010050                    MOV     #FNC.10,-(SP)
12444 043646  012746  006426                    MOV     #WRD.12,-(SP)
12445 043652  012746  007472                    MOV     #PHR.5,-(SP)
12446 043656  012746  006322                    MOV     #WRD.4,-(SP)
12447 043662  012746  006062                    MOV     #FIV.FMT,-(SP)
12448 043666  012746  000006                    MOV     #6,-(SP)
12449 043672  010600                            MOV     SP,R0                           ; SP,*
12450 043674  104414                            TRAP    14
12451 043676  010116                            MOV     R1,(SP)                         ; ARR.SEL,*                             6181
12452 043700  012746  004644                    MOV     #FMT.9,-(SP)
12453 043704  012746  000002                    MOV     #2,-(SP)
12454 043710  010600                            MOV     SP,R0                           ; SP,*
12455 043712  104414                            TRAP    14
12456 043714  062706  000022                    ADD     #22,SP                          ;                                       6178
12457 043720  104467                    5$:     TRAP    67                              ;                                       6182
12458 043722  006000                            ROR     R0
12459 043724  103712                            BLO     4$
12460 043726  060301                            ADD     R3,R1                           ; *,ARR.SEL                             6169
12461 043730  020102                    6$:     CMP     R1,R2                           ; ARR.SEL,*
12462 043732  003707                            BLE     4$
12463 043734  026727  145620  000017            CMP     OP.NUM.ARR,#17                  ;                                       6187
12464 043742  002102                            BGE     10$
12465 043744  016701  145626                    MOV     LST.ARR,R1                      ;                                       6190
12466 043750  066701  145606                    ADD     ARR.INC,R1
12467 043754  016703  145614                    MOV     ARR.16,R3
```

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12469                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
12470                                   ;                                                       14-May-1981 13:05:08    PA:<
12471
12472 043760  016702  145576                    MOV     ARR.INC,R2
12473 043764  000467                            BR      9$
12474 043766  104402                    7$:     TRAP    2                               ;                               6192
12475 043770  152777  000040  147216            BISB    #40,@ML.REG+40                  ;                               6193
12476 043776  016700  147600                    MOV     ML.DUT,R0
12477 044002  042700  177770                    BIC     #177770,R0
12478 044006  142777  000007  147200            BICB    #7,@ML.REG+40
12479 044014  150077  147174                    BISB    R0,@ML.REG+40
12480 044020  010177  147160                    MOV     R1,@ML.REG+30                   ; ARR.SEL,*                     6195
12481 044024  012777  000031  147122            MOV     #31,@ML.REG                     ;                               6196
12482 044032  032777  020000  147174            BIT     #20000,@ML.REG+60               ;                               6198
12483 044040  001035                            BNE     8$
12484 044042  104455                            TRAP    55                              ;                               6201
12485 044044  000075                            .WORD   75
12486 044046  010464                            .WORD   ASYNC
12487 044050  024060                            .WORD   DUMPER
12488 044052  012746  006506                    MOV     #WRD.19,-(SP)                   ;                               6202
12489 044056  012746  010050                    MOV     #FNC.10,-(SP)
12490 044062  012746  006426                    MOV     #WRD.12,-(SP)
12491 044066  012746  007366                    MOV     #PHR.1,-(SP)
12492 044072  012746  006322                    MOV     #WRD.4,-(SP)
12493 044076  012746  006062                    MOV     #FIV.FMT,-(SP)
12494 044102  012746  000006                    MOV     #6,-(SP)
12495 044106  010600                            MOV     SP,R0                           ; SP,*
12496 044110  104414                            TRAP    14
12497 044112  010116                            MOV     R1,(SP)                         ; ARR.SEL,*                     6203
12498 044114  012746  004644                    MOV     #FMT.9,-(SP)
12499 044120  012746  000002                    MOV     #2,-(SP)
12500 044124  010600                            MOV     SP,R0                           ; SP,*
12501 044126  104414                            TRAP    14
12502 044130  062706  000022                    ADD     #22,SP                          ;                               6200
12503 044134  104467                    8$:     TRAP    67                              ;                               6204
12504 044136  006000                            ROR     R0
12505 044140  103712                            BLO     7$
12506 044142  060201                            ADD     R2,R1                           ; *,ARR.SEL                     6190
12507 044144  020103                    9$:     CMP     R1,R3                           ; ARR.SEL,*
12508 044146  003707                            BLE     7$
12509 044150  000207                    10$:    RTS     PC                              ;                               6112
12510
12511                                   ; Routine Size:  234 words
12512                                   ; Maximum stack depth per invocation:  13 words
12517
12518
12522
12523                                           .SBTTL  T20
```

```
12525                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
12526                                   ;                                                       14-May-1981 13:05:08    PA:<
12527
12531 044152                            T20::
12532 044152  004767  177050            1$:     JSR     PC,$T20                 ;                                       6209
12533 044156  104466                            TRAP    66
12534 044160  006000                            ROR     R0
12535 044162  103773                            BLO     1$
12536 044164  000207                            RTS     PC
12537
12538                                   ; Routine Size:  6 words
12539                                   ; Maximum stack depth per invocation:  0 words
12544
12545
12546 ;         6212  !<BLF/PAGE>
```

```
12548 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
12549 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (71)
12550
12551 ;          6213  !
12552 ;          6214  BGNTST;
12553 ;          6215
12554 ;          6216  !++
12555 ;          6217  ! TEST NUMBER:  TST 21
12556 ;          6218  !
12557 ;          6219  ! TEST NAME:    READ IN PRESET TEST
12558 ;          6220  !
12559 ;          6221  ! TEST DESCRIPTION:
12560 ;          6222  !       TEST THE READ IN PRESET FUNCTION BY:
12561 ;          6223  !
12562 ;          6224  !       1.  PERFORMING A READ-IN-PRESET FUNCTION AND TESTING GO, ERROR BITS
12563 ;          6225  !           AND VV FOR SET / NOT SET.
12564 ;          6226  !
12565 ;          6227  !--
12566 ;          6228
12567 ;          6229  CLR_MBUS;
12568 ;          6230  MLCS1 = RD_IN_PRE;                          !DO A READ IN PRESET FUNCTION
12569 ;          6231
12570 ;          6232  if .GO IS_SET                               !SEE IF GO IS NOT SET
12571 ;          6233  then
12572 ;          6234      begin
12573 ;          6235      ERRDF (62, ASYNC, DUMPER);              !ERROR IF SET
12574 ;          6236      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_11, WRD_19);
12575 ;          6237      end;
12576 ;          6238
12577 ;          6239  if .ILF IS_SET                              !SEE IF ILF IS NOT SET
12578 ;          6240  then
12579 ;          6241      begin
12580 ;          6242      ERRDF (63, ASYNC, DUMPER);              !ERROR IF SET
12581 ;          6243      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_11, WRD_19);
12582 ;          6244      end;
12583 ;          6245
12584 ;          6246  if .OPI IS_SET                              !SEE IF OPI IS NOT SET
12585 ;          6247  then
12586 ;          6248      begin
12587 ;          6249      ERRDF (64, ASYNC, DUMPER);              !ERROR IF SET
12588 ;          6250      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_11, FNC_11, WRD_19);
12589 ;          6251      end;
12590 ;          6252
12591 ;          6253  if .VV IS_NOT_SET                           !SEE IF VV IS SET
12592 ;          6254  then
12593 ;          6255      begin
12594 ;          6256      ERRDF (65, ASYNC, DUMPER);              !ERROR IF NOT SET
12595 ;          6257      PRINTB (FIV_FMT, WRD_18, PHR_1, WRD_11, FNC_11, WRD_19);
12596 ;          6258      end;
12597 ;          6259
12598 ;          6260  ENDTST;
12602
12603                    ;ML4                                     14-May-1981 13:48:54    TOPS
12604                    ;                                        14-May-1981 13:05:08    PA:<
12605
12606                                .SBTTL  $T21
12610 044166  152777  000040  147020  $T21:   BISB    #40,@ML.REG+40                  ;                6214
```

```
12611 044174  016700  147402                MOV     ML.DUT,R0
12612 044200  042700  177770                BIC     #177770,R0
12613 044204  142777  000007  147002        BICB    #7,@ML.REG+40
12614 044212  150077  146776                BISB    R0,@ML.REG+40
12615 044216  012777  000021  146730        MOV     #21,@ML.REG                     ;                       6230
12616 044224  132777  000001  146722        BITB    #1,@ML.REG                      ;                       6232
12617 044232  001426                        BEQ     1$
12618 044234  104455                        TRAP    55                              ;                       6235
12619 044236  000076                        .WORD   76
12620 044240  010464                        .WORD   ASYNC
12621 044242  024060                        .WORD   DUMPER
12622 044244  012746  006506                MOV     #WRD.19,-(SP)                   ;                       6236
12623 044250  012746  010060                MOV     #FNC.11,-(SP)
12624 044254  012746  006416                MOV     #WRD.11,-(SP)
12625 044260  012746  007404                MOV     #PHR.2,-(SP)
12626 044264  012746  006276                MOV     #WRD.1,-(SP)
12627 044270  012746  006062                MOV     #FIV.FMT,-(SP)
12628 044274  012746  000006                MOV     #6,-(SP)
12629 044300  010600                        MOV     SP,R0                           ; SP,*
12630 044302  104414                        TRAP    14
12631 044304  062706  000016                ADD     #16,SP                          ;                       6234
12632 044310  132777  000001  146716  1$:   BITB    #1,@ML.REG+60                   ;                       6239
12633 044316  001426                        BEQ     2$
12634 044320  104455                        TRAP    55                              ;                       6242
12635 044322  000077                        .WORD   77
12636 044324  010464                        .WORD   ASYNC
12637 044326  024060                        .WORD   DUMPER
12638 044330  012746  006506                MOV     #WRD.19,-(SP)                   ;                       6243
12639 044334  012746  010060                MOV     #FNC.11,-(SP)
12640 044340  012746  006416                MOV     #WRD.11,-(SP)
12641 044344  012746  007472                MOV     #PHR.5,-(SP)
12642 044350  012746  006314                MOV     #WRD.3,-(SP)
12643 044354  012746  006062                MOV     #FIV.FMT,-(SP)
12644 044360  012746  000006                MOV     #6,-(SP)
12645 044364  010600                        MOV     SP,R0                           ; SP,*
12646 044366  104414                        TRAP    14
12647 044370  062706  000016                ADD     #16,SP                          ;                       6241
12648 044374  032777  020000  146632  2$:   BIT     #20000,@ML.REG+60               ;                       6246
12649 044402  001426                        BEQ     3$
12650 044404  104455                        TRAP    55                              ;                       6249
12651 044406  000100                        .WORD   100
12652 044410  010464                        .WORD   ASYNC
12653 044412  024060                        .WORD   DUMPER
12654 044414  012746  006506                MOV     #WRD.19,-(SP)                   ;                       6250
12655 044420  012746  010060                MOV     #FNC.11,-(SP)
12656 044424  012746  006416                MOV     #WRD.11,-(SP)
12657 044430  012746  007472                MOV     #PHR.5,-(SP)
12658                       ;ML4                                                    14-May-1981 13:48:54    TOPS
12659                       ;                                                       14-May-1981 13:05:08    PA:<
12660
12661 044434  012746  006322                MOV     #WRD.4,-(SP)
12662 044440  012746  006062                MOV     #FIV.FMT,-(SP)
12663 044444  012746  000006                MOV     #6,-(SP)
12664 044450  010600                        MOV     SP,R0                           ; SP,*
12665 044452  104414                        TRAP    14
12666 044454  062706  000016                ADD     #16,SP                          ;                       6248
12667 044460  132777  000100  146536  3$:   BITB    #100,@ML.REG+50                 ;                       6253
```

```
12668 044466  001026                    BNE     4$
12669 044470  104455                    TRAP    55                              ;                       6256
12670 044472  000101                    .WORD   101
12671 044474  010464                    .WORD   ASYNC
12672 044476  024060                    .WORD   DUMPER
12673 044500  012746  006506            MOV     #WRD.19,-(SP)                   ;                       6257
12674 044504  012746  010060            MOV     #FNC.11,-(SP)
12675 044510  012746  006416            MOV     #WRD.11,-(SP)
12676 044514  012746  007366            MOV     #PHR.1,-(SP)
12677 044520  012746  006502            MOV     #WRD.18,-(SP)
12678 044524  012746  006062            MOV     #FIV.FMT,-(SP)
12679 044530  012746  000006            MOV     #6,-(SP)
12680 044534  010600                    MOV     SP,R0                           ; SP,*
12681 044536  104414                    TRAP    14
12682 044540  062706  000016            ADD     #16,SP                          ;                       6255
12683 044544  000207              4$:   RTS     PC                              ;                       6211
12684
12685                                   ; Routine Size:  120 words
12686                                   ; Maximum stack depth per invocation:  7 words
12691
12692
12696
12697                                   .SBTTL  T21
12701 044546                      T21::
12702 044546  004767  177414      1$:   JSR     PC,$T21                         ;                       6258
12703 044552  104466                    TRAP    66
12704 044554  006000                    ROR     R0
12705 044556  103773                    BLO     1$
12706 044560  000207                    RTS     PC
12707
12708                                   ; Routine Size:  6 words
12709                                   ; Maximum stack depth per invocation:  0 words
12717
12718
12719 ;           6261  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (72)

```
12721 ;ML4
12722 ;
12723
12724 ;          6262  !
12725 ;          6263  !
12726 ;          6264  BGNTST;
12727 ;          6265
12728 ;          6266  !++
12729 ;          6267  ! TEST NUMBER:  TST 22
12730 ;          6268  !
12731 ;          6269  ! TEST NAME:    ILLEGAL FUNCTION TEST
12732 ;          6270  !
12733 ;          6271  ! TEST DESCRIPTION:
12734 ;          6272  !
12735 ;          6273  !       TEST THE DETECTION OF ILLEGAL
12736 ;          6274  !       FUNCTIONS WRITTEN TO MLCS1
12737 ;          6275  !       BY:
12738 ;          6276  !
12739 ;          6277  !       WRITING ALL POSSIBLE ILLEGAL
12740 ;          6278  !       FUNCTIONS TO MLCS1.  THEN
12741 ;          6279  !       TEST GO AND ERROR BITS CLEARED.
12742 ;          6280  !
12743 ;          6281  !--
12744 ;          6282
12745 ;          6283  local
12746 ;          6284      BAD_BITS,                          !STORES A COUNT TO GENERATE BAD FUNCTIONS
12747 ;          6285      BAD_FUNC;                          !STORES GENERATED BAD FUNCTION
12748 ;          6286
12749 ;          6287  BAD_BITS = ZEROES;                     !CLEAR BAD BITS
12750 ;          6288
12751 ;          6289  incr CNT_1 from 0 to 2 do              !REPEAT LOOP 3 TIMES
12752 ;          6290      begin
12753 ;          6291      BAD_BITS = .BAD_BITS + %o'2';      !ADD 2 TO BAD_BITS
12754 ;          6292
12755 ;          6293      incr CNT_2 from %o'1' to %o'71' by %o'10' do        !REPEAT LOOP GENERATING 'GOOD' FUNCTIONS
12756 ;          6294          begin
12757 ;          6295          BGNSUB;
12758 ;          6296          CLR_MBUS;
12759 ;          6297          BAD_FUNC = .CNT_2 + .BAD_BITS;     !ADD BAD_BITS TO CNT_2 GENERATING BAD FUNCTIONS
12760 ;          6298          FIRST_BLK_XFER ();                 !SET UP A FIRST BLOCK XFERR
12761 ;          6299          MLCS1 = .BAD_FUNC;                 !LOAD MLCS1 WITH TWO BAD FUNCTIONS
12762 ;          6300
12763 ;          6301          if .ILF IS_SET                     !SEE IF ILF IS SET
12764 ;          6302          then
12765 ;          6303              begin
12766 ;          6304
12767 ;          6305              if .GO IS_SET                  !IF ILF IS SET THEN SEE IF GO IS SET
12768 ;          6306              then
12769 ;          6307                  begin
12770 ;          6308                  ERRDF (66, ASYNC, DUMPER);     !ERROR IF GO SET WITH BAD FUNCTION
12771 ;          6309                  PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_12, WRD_19);
12772 ;          6310                  PRINTB (FMT_12, .BAD_FUNC);
12773 ;          6311                  end;
12774 ;          6312
12775 ;          6313              end
```

```
12777 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
12778 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (72)
12779
12780 ;          6314          else
12781 ;          6315              begin
12782 ;          6316              ERRDF (67, ASYNC, DUMPER);          !ERROR BAD FUNCTION DON'T CAUSE ILF
12783 ;          6317              PRINTB (FIV_FMT, WRD_3, PHR_1, WRD_11, FNC_12, WRD_19);
12784 ;          6318              PRINTB (FMT_12, .BAD_FUNC);
12785 ;          6319              end;
12786 ;          6320
12787 ;          6321          if .OPI IS_SET                      !SEE IF OPI IS SET
12788 ;          6322          then
12789 ;          6323              begin
12790 ;          6324              ERRDF (68, ASYNC, DUMPER);          !ERROR IF SET
12791 ;          6325              PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_12, WRD_19);
12792 ;          6326              PRINTB (FMT_12, .BAD_FUNC);
12793 ;          6327              end;
12794 ;          6328
12795 ;          6329          ENDSUB;
12796 ;          6330          end;
12797 ;          6331
12798 ;          6332      end;
12799 ;          6333
12800 ;          6334  ENDTST;
12804
12805                                  .SBTTL  $T22
12809 044562  004167  137330    $T22: JSR     R1,$SAVE5                 ;                                  6260
12810 044566  005004                  CLR     R4                        ; BAD.BITS                         6287
12811 044570  005001                  CLR     R1                        ; CNT.1                            6289
12812 044572  062704  000002    1$:   ADD     #2,R4                     ; *,BAD.BITS                       6291
12813 044576  012702  000001          MOV     #1,R2                     ; *,CNT.2                          6293
12814 044602  010405            2$:   MOV     R4,R5                     ; BAD.BITS,*                       6297
12815 044604  060205                  ADD     R2,R5                     ; CNT.2,*
12816 044606  104402            3$:   TRAP    2                         ;                                  6294
12817 044610  152777  000040  146376    BISB    #40,@ML.REG+40          ;                                  6295
12818 044616  016700  146760          MOV     ML.DUT,R0
12819 044622  042700  177770          BIC     #177770,R0
12820 044626  142777  000007  146360    BICB    #7,@ML.REG+40
12821 044634  150077  146354          BISB    R0,@ML.REG+40
12822 044640  010503                  MOV     R5,R3                     ; *,BAD.FUNC                       6297
12823 044642  004767  151172          JSR     PC,FIRST.BLK.XFER         ;                                  6298
12824 044646  010377  146302          MOV     R3,@ML.REG                ; BAD.FUNC,*                       6299
12825 044652  132777  000001  146354    BITB    #1,@ML.REG+60           ;                                  6301
12826 044660  001440                  BEQ     4$
12827 044662  132777  000001  146264    BITB    #1,@ML.REG              ;                                  6305
12828 044670  001471                  BEQ     6$
12829 044672  104455                  TRAP    55                        ;                                  6308
12830 044674  000102                  .WORD   102
12831 044676  010464                  .WORD   ASYNC
```

```
12833                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
12834                                   ;                                                       14-May-1981 13:05:08    PA:<
12835
12836 044700  024060                          .WORD   DUMPER
12837 044702  012746  006506                  MOV     #WRD.19,-(SP)           ;                                       6309
12838 044706  012746  010100                  MOV     #FNC.12,-(SP)
12839 044712  012746  006416                  MOV     #WRD.11,-(SP)
12840 044716  012746  007404                  MOV     #PHR.2,-(SP)
12841 044722  012746  006276                  MOV     #WRD.1,-(SP)
12842 044726  012746  006062                  MOV     #FIV.FMT,-(SP)
12843 044732  012746  000006                  MOV     #6,-(SP)
12844 044736  010600                          MOV     SP,R0                   ; SP,*
12845 044740  104414                          TRAP    14
12846 044742  010316                          MOV     R3,(SP)                 ; BAD.FUNC,*                            6310
12847 044744  012746  005004                  MOV     #FMT.12,-(SP)
12848 044750  012746  000002                  MOV     #2,-(SP)
12849 044754  010600                          MOV     SP,R0                   ; SP,*
12850 044756  104414                          TRAP    14
12851 044760  000433                          BR      5$                      ;                                       6307
12852 044762  104455                  4$:     TRAP    55                      ;                                       6316
12853 044764  000103                          .WORD   103
12854 044766  010464                          .WORD   ASYNC
12855 044770  024060                          .WORD   DUMPER
12856 044772  012746  006506                  MOV     #WRD.19,-(SP)           ;                                       6317
12857 044776  012746  010100                  MOV     #FNC.12,-(SP)
12858 045002  012746  006416                  MOV     #WRD.11,-(SP)
12859 045006  012746  007366                  MOV     #PHR.1,-(SP)
12860 045012  012746  006314                  MOV     #WRD.3,-(SP)
12861 045016  012746  006062                  MOV     #FIV.FMT,-(SP)
12862 045022  012746  000006                  MOV     #6,-(SP)
12863 045026  010600                          MOV     SP,R0                   ; SP,*
12864 045030  104414                          TRAP    14
12865 045032  010316                          MOV     R3,(SP)                 ; BAD.FUNC,*                            6318
12866 045034  012746  005004                  MOV     #FMT.12,-(SP)
12867 045040  012746  000002                  MOV     #2,-(SP)
12868 045044  010600                          MOV     SP,R0                   ; SP,*
12869 045046  104414                          TRAP    14
12870 045050  062706  000022          5$:     ADD     #22,SP                  ;                                       6315
12871 045054  032777  020000  146152  6$:     BIT     #20000,@ML.REG+60       ;                                       6321
12872 045062  001435                          BEQ     7$
12873 045064  104455                          TRAP    55                      ;                                       6324
12874 045066  000104                          .WORD   104
12875 045070  010464                          .WORD   ASYNC
12876 045072  024060                          .WORD   DUMPER
12877 045074  012746  006506                  MOV     #WRD.19,-(SP)           ;                                       6325
12878 045100  012746  010100                  MOV     #FNC.12,-(SP)
12879 045104  012746  006426                  MOV     #WRD.12,-(SP)
12880 045110  012746  007472                  MOV     #PHR.5,-(SP)
12881 045114  012746  006322                  MOV     #WRD.4,-(SP)
12882 045120  012746  006062                  MOV     #FIV.FMT,-(SP)
12883 045124  012746  000006                  MOV     #6,-(SP)
12884 045130  010600                          MOV     SP,R0                   ; SP,*
12885 045132  104414                          TRAP    14
12886 045134  010316                          MOV     R3,(SP)                 ; BAD.FUNC,*                            6326
12887 045136  012746  005004                  MOV     #FMT.12,-(SP)
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
045142  012746  000002                MOV     #2,-(SP)
045146  010600                        MOV     SP,R0                   ; SP,*
045150  104414                        TRAP    14
045152  062706  000022                ADD     #22,SP                  ;                                       6323
045156  104467                7$:     TRAP    67                      ;                                       6327
045160  006000                        ROR     R0
045162  103611                        BLO     3$
045164  062702  000010                ADD     #10,R2                  ; *,CNT.2                               6293
045170  020227  000071                CMP     R2,#71                  ; CNT.2,*
045174  003602                        BLE     2$
045176  005201                        INC     R1                      ; CNT.1                                 6289
045200  020127  000002                CMP     R1,#2                   ; CNT.1,*
045204  003002                        BGT     8$
045206  000167  177360                JMP     1$
045212  000207                8$:     RTS     PC                      ;                                       6260

                                ; Routine Size:  141 words
                                ; Maximum stack depth per invocation:  15 words


                                        .SBTTL  T22
045214                          T22::
045214  004767  177342          1$:     JSR     PC,$T22                 ;                                       6332
045220  104466                        TRAP    66
045222  006000                        ROR     R0
045224  103773                        BLO     1$
045226  000207                        RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


                        ;       6335  !<BLF/PAGE>
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (73)

                6336  !
                6337  !
                6338  BGNTST;
                6339
                6340  !++
                6341  ! TEST NUMBER:  TST 23
                6342  !
                6343  ! TEST NAME:    REGISTER MODIFICATION REFUSED TEST
                6344  !
                6345  ! TEST DESCRIPTION:
                6346  !
                6347  !       TEST THE DETECTION OF A
                6348  !       REGISTER MODIFICATION REFUSED
                6349  !       BY:
                6350  !
                6351  !       1.  WRITTING TO MLCS1, MLDA
                6352  !           AND MLER WHILE THE DRIVE
                6353  !           IS BUSY AND TEST RMR
                6354  !           BIT SET.
                6355  !
                6356  !       ALSO SEE IF THE DRIVE ASSERTED
                6357  !       EXCEPTION BY TESTING THE TRE BIT SET.
                6358  !
                6359  !--
                6360
                6361  incr CNT from 0 to 2 do                       !REPEAT LOOP 3 TIMES
                6362      begin
                6363      BGNSUB;
                6364      CLR_MBUS;
                6365      MLCS1 = write;                            !DO A WRITE FUNCTION
                6366
                6367      case .CNT from 0 to 2 of                  !WRITE TO SELECTED REGISTERS FORCING RMR
                6368          set
                6369
                6370          [0] :
                6371              MLCS1 = %o'000000';
                6372
                6373          [1] :
                6374              MLDA = ONES;
                6375
                6376          [2] :
                6377              MLER = ONES
                6378          tes;
                6379
                6380      DELAY (FRTY_US);
                6381
                6382      if .RMR IS_NOT_SET                        !SEE IF RMR GOT SET
                6383      then
                6384          begin
                6385          ERRDF (69, ASYNC, DUMPER);            !ERROR IF NOT SET
                6386          PRINTB (FOR_FMT, WRD_21, PHR_1, WRD_11, WRD_21);
                6387          end;
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (73)
12997 :ML4
12998 ;
12999
13000 ;          6388
13001 ;          6389        if .TRE IS_NOT_SET                      !SEE IF DRIVE ASSERTED EXCEPTION BY TESTING TRE
13002 ;          6390        then
13003 ;          6391            begin
13004 ;          6392            ERRDF (117, SYNC, DUMPER);
13005 ;          6393            PRINTB (FOR_FMT, WRD_20, PHR_1, WRD_11, WRD_21);
13006 ;          6394            end;
13007 ;          6395
13008 ;          6396        ENDSUB;
13009 ;          6397        end;
13010 ;          6398
13011 ;          6399    ENDTST;
13015
13016                                        .SBTTL  $T23
13020 045230  004167  136610          $T23: JSR     R1,$SAVE2                 ;                                  6334
13021 045234  005746                        TST     -(SP)
13022 045236  005002                        CLR     R2                        ; CNT                            6361
13023 045240  104402                  1$:   TRAP    2                         ;                                  6362
13024 045242  152777  000040  145744        BISB    #40,@ML.REG+40            ;                                  6363
13025 045250  016701  146326                MOV     ML.DUT,R1
13026 045254  042701  177770                BIC     #177770,R1
13027 045260  142777  000007  145726        BICB    #7,@ML.REG+40
13028 045266  150177  145722                BISB    R1,@ML.REG+40
13029 045272  012777  000061  145654        MOV     #61,@ML.REG               ;                                  6365
13030 045300  010201                        MOV     R2,R1                     ; CNT,*                          6367
13031 045302  006301                        ASL     R1
13032 045304  066107  045310                ADD     2$(R1),PC
13033 045310  000006                  2$:   .WORD   3$-2$
13034 045312  000014                        .WORD   4$-2$
13035 045314  000024                        .WORD   5$-2$
13036 045316  005077  145632          3$:   CLR     @ML.REG                   ;                                  6371
13037 045322  000407                        BR      6$                        ;                                  6367
13038 045324  012777  177777  145652  4$:   MOV     #-1,@ML.REG+30            ;                                  6374
13039 045332  000403                        BR      6$                        ;                                  6367
13040 045334  012777  177777  145672  5$:   MOV     #-1,@ML.REG+60            ;                                  6377
13041 045342  012700  000050          6$:   MOV     #50,R0                    ; *,$$TMP2                       6380
13042 045346  001410                  7$:   BEQ     10$
13043 045350  016701  134542                MOV     L$DLY,R1                  ; *,$$TMP1
13044 045354  001403                        BEQ     9$
13045 045356  005016                  8$:   CLR     (SP)                      ; $$TMP
13046 045360  005301                        DEC     R1                        ; $$TMP1
13047 045362  001375                        BNE     8$
13048 045364  005300                  9$:   DEC     R0                        ; $$TMP2
13049 045366  000767                        BR      7$
13050 045370  132777  000004  145636  10$:  BITB    #4,@ML.REG+60             ;                                  6382
13051 045376  001024                        BNE     11$
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                
045400  104455                          TRAP    55                      ;                                       6385
045402  000105                          .WORD   105
045404  010464                          .WORD   ASYNC
045406  024060                          .WORD   DUMPER
045410  012746  006522                  MOV     #WRD.21,-(SP)           ;                                       6386
045414  012746  006416                  MOV     #WRD.11,-(SP)
045420  012746  007366                  MOV     #PHR.1,-(SP)
045424  012746  006522                  MOV     #WRD.21,-(SP)
045430  012746  006046                  MOV     #FOR.FMT,-(SP)
045434  012746  000005                  MOV     #5,-(SP)
045440  010600                          MOV     SP,R0                   ; SP,*
045442  104414                          TRAP    14
045444  062706  000014                  ADD     #14,SP                  ;                                       6384
045450  032777  040000  145476  11$:    BIT     #40000,@ML.REG          ;                                       6389
045456  001024                          BNE     12$
045460  104455                          TRAP    55                      ;                                       6392
045462  000165                          .WORD   165
045464  010526                          .WORD   SYNC
045466  024060                          .WORD   DUMPER
045470  012746  006522                  MOV     #WRD.21,-(SP)           ;                                       6393
045474  012746  006416                  MOV     #WRD.11,-(SP)
045500  012746  007366                  MOV     #PHR.1,-(SP)
045504  012746  006514                  MOV     #WRD.20,-(SP)
045510  012746  006046                  MOV     #FOR.FMT,-(SP)
045514  012746  000005                  MOV     #5,-(SP)
045520  010600                          MOV     SP,R0                   ; SP,*
045522  104414                          TRAP    14
045524  062706  000014                  ADD     #14,SP                  ;                                       6391
045530  104467                  12$:    TRAP    67                      ;                                       6394
045532  006000                          ROR     R0
045534  103641                          BLO     1$
045536  005202                          INC     R2                      ; CNT                                   6361
045540  020227  000002                  CMP     R2,#2                   ; CNT,*
045544  003635                          BLE     1$
045546  005726                          TST     (SP)+                   ;                                       6334
045550  000207                          RTS     PC

                                ; Routine Size:  105 words
                                ; Maximum stack depth per invocation:  10 words


                                .SBTTL  T23
```

```
 13113 045552                       T23::
 13114 045552  004767  177452       1$:     JSR     PC,$T23                 ;        6397
 13115 045556  104466                       TRAP    66
 13116 045560  006000                       ROR     R0
 13117 045562  103773                       BLO     1$
 13118 045564  000207                       RTS     PC
 13119
 13120                              ; Routine Size:  6 words
 13121                              ; Maximum stack depth per invocation:  0 words
 13126
 13127
 13128 ;          6400  !<BLF/PAGE>
```

```
13130 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
13131 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (74)
13132
13133 ;          6401  !
13134 ;          6402  !
13135 ;          6403  BGNTST;
13136 ;          6404
13137 ;          6405  !++
13138 ;          6406  ! TEST NUMBER:  TST 24
13139 ;          6407  !
13140 ;          6408  ! TEST NAME : initial PROM TEST
13141 ;          6409  !
13142 ;          6410  ! TEST DESCRIPTION:
13143 ;          6411  !
13144 ;          6412  !       TEST THE MEMORY ARRAYS' PROM
13145 ;          6413  !       TIMING AND CONTROL LOGIC FOR
13146 ;          6414  !       INITIAL PROM READS BY:
13147 ;          6415  !
13148 ;          6416  !       1.  READING 14 PROM LOCATIONS
13149 ;          6417  !           AND TESTING FOR:
13150 ;          6418  !
13151 ;          6419  !           A. CHECK SUM ERRORS AT
13152 ;          6420  !              EACH ROW COLUMN ADRS
13153 ;          6421  !
13154 ;          6422  !           B. SUM OF EACH PROM BIT SET
13155 ;          6423  !              <9,0> GTR 14.
13156 ;          6424  !
13157 ;          6425  !--
13158 ;          6426
13159 ;          6427  local
13160 ;          6428      OFF_SET_CNT : vector [10, byte],      !COUNTS EACH NIBBLE OFFSET
13161 ;          6429      ROW_ORED_COL : bitvector [16],        !SAVES ROW DATA OR'ED WITH COL DATA
13162 ;          6430      R_C_SAV : bitvector [16],             !TEMP LOCATION FOR ROW COL DATA
13163 ;          6431      PROM_ADRS,                            !PROM ADDRESS
13164 ;          6432      CHK_SUM,                              !CHECK SUM DATA
13165 ;          6433      CHK_SUM_ERR,                          !CHECK SUM ERROR
13166 ;          6434      BAD_NIB_CNT,                          !COUNTS BAD NIBBLES
13167 ;          6435      CNT_14_BAD,                           !COUNTS BAD NIBBLE POSITION EQL 14
13168 ;          6436      DODO_FLG,                             !DROP UNIT FLAG
13169 ;          6437      ERR_FLG;                              !ERROR FLAG
13170 ;          6438
13171 ;          6439  CLR_MBUS;
13172 ;          6440  DODO_FLG = ZERO;
13173 ;          6441  PROM_DIS = ONE;                           !SET PROM DISABLE MODE
13174 ;          6442  CHK_SUM_ERR = ZEROES;
13175 ;          6443
13176 ;          6444  incr CNT from 0 to 9 do                   !CLEAR OFFSET COUNTS
13177 ;          6445      OFF_SET_CNT [.CNT] = ZEROES;
13178 ;          6446
13179 ;          6447  incr ADRS_CNT from 0 to 14 do             !READ PROM DATA FROM 15 ARRAY WORDS
13180 ;          6448      begin
13181 ;          6449      ROW_ORED_COL = ZEROES;                !CLEAR ROW ORED COL SAVE LOCATION
13182 ;          6450      PROM_ADRS = .ADRS_CNT;                !GET COPY OF ADRS_CNT
13183 ;          6451
13184 ;          6452          incr TWICE from 0 to 1 do         !READ ROW AND COL DATA FOR THIS ARRAY WORD
```

```
13186 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
13187 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (74)
13188
13189 ;         6453        begin
13190 ;         6454        BAD_NIB_CNT = ZEROES;
13191 ;         6455        ERR_FLG = ZERO;
13192 ;         6456        MLPA = .PROM_ADRS;                    !LOADING MLPA INITIATES PROM READ
13193 ;         6457        DELAY (ONE_US);
13194 ;         6458        R_C_SAV = .MLPD;                      !GET THE ROW OR COL DATA
13195 ;         6459
13196 ;         6460        incr BIT_CNT from 0 to 9 do           !COUNT NUMBER BITS SET IN <9:0>
13197 ;         6461
13198 ;         6462            if .R_C_SAV [.BIT_CNT] IS_SET then BAD_NIB_CNT = .BAD_NIB_CNT + 1;
13199 ;         6463
13200 ;         6464        CHK_SUM = .R_C_SAV<10, 3>;            !GET THE CHECK SUM BITS
13201 ;         6465
13202 ;         6466        if .R_C_SAV [13] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 13
13203 ;         6467
13204 ;         6468        if .R_C_SAV [14] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 14
13205 ;         6469
13206 ;         6470        if .R_C_SAV [15] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 15
13207 ;         6471
13208 ;         6472        if .R_C_SAV [15] IS_SET               !IS BIT 15 SET
13209 ;         6473        then
13210 ;         6474            begin
13211 ;         6475
13212 ;         6476            if .BAD_NIB_CNT lss .CHK_SUM then ERR_FLG = ONE;    !SET ERROR FLG IF CHECK SUM ERROR
13213 ;         6477
13214 ;         6478            end
13215 ;         6479        else
13216 ;         6480            begin
13217 ;         6481
13218 ;         6482            if .BAD_NIB_CNT neq .CHK_SUM then ERR_FLG = ONE;    !SET ERROR FLG IF CHECK SUM ERROR
13219 ;         6483
13220 ;         6484            end;
13221 ;         6485
13222 ;         6486        if .ERR_FLG IS_SET                    !WAS THERE A CHECK SUM ERROR
13223 ;         6487        then
13224 ;         6488            begin                             !REPORT INTERMEDIATE ERROR IF YES
13225 ;         6489            ERRDF (70, INTER, DUMPER);
13226 ;         6490            PRINTB (SIX_FMT, FNC_21, WRD_10, WRD_12, WRD_45, WRD_35, FNC_6);
13227 ;         6491            PRINTB (FMT_10, .CHK_SUM, .R_C_SAV);
13228 ;         6492            DODU_FLG = ONE;
13229 ;         6493            end;
13230 ;         6494
13231 ;         6495        ROW_ORED_COL = (.ROW_ORED_COL) or (.R_C_SAV);   !OR ROW AND COLUMN DATA
13232 ;         6496        PROM_ADRS = (.PROM_ADRS) or (%o'2000');!GET COLUMN DATA
13233 ;         6497        end;
13234 ;         6498
13235 ;         6499    incr index from 0 to 9 do                 !GET TOTAL OFF SET COUNTS FROM THE 15 ARRAY WORDS
13236 ;         6500
13237 ;         6501        if .ROW_ORED_COL [.index] IS_SET then OFF_SET_CNT [.index] = .OFF_SET_CNT [.index] + 1;
13238 ;         6502
13239 ;         6503    end;
13240 ;         6504
```

```
13242 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
13243 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (74)
13244
13245 ;          6505  CNT_14_BAD = ZEROES;
13246 ;          6506
13247 ;          6507  incr CNT from 0 to 9 do                !COUNT HOW MANY OFFSET COUNTS GEQ 14
13248 ;          6508
13249 ;          6509      if .OFF_SET_CNT [.CNT] geq 14 then CNT_14_BAD = .CNT_14_BAD + 1;
13250 ;          6510
13251 ;          6511  if .CNT_14_BAD neq ZERO                !WAS ANY OFF_SET COUNTS GTR ZERO
13252 ;          6512  then
13253 ;          6513      begin
13254 ;          6514      ERRDF (71, ARR_DAT, DUMPER);       !ERROR IF YES
13255 ;          6515
13256 ;          6516      if .CNT_14_BAD eql 10              !WERE ALL 10 NIBBLE OFFSETS GEQ 14
13257 ;          6517      then
13258 ;          6518          PRINTB (SIX_FMT, WRD_55, WRD_54, WRD_46, WRD_51, WRD_42, WRD_40)        !ERROR IF YES
13259 ;          6519      else                               !IF NO THEN PRINT WHICH ONES WERE
13260 ;          6520          begin
13261 ;          6521          PRINTB (FOR_FMT, WRD_46, WRD_47, WRD_42, WRD_40);       !PRINT MESSAGE
13262 ;          6522
13263 ;          6523          incr CNT from 0 to 9 do            !FIND OFFSETS GEQ 14
13264 ;          6524
13265 ;          6525              if .OFF_SET_CNT [.CNT] geq 14 then PRINTB (FMT_13, .CNT, (.OFF_SET_CNT [.CNT]));
13266 ;          6526
13267 ;          6527                                             !PRINT NIBBLE POSITION AND COUNT
13268 ;          6528          end;
13269 ;          6529
13270 ;          6530      DODU_FLG = ONE;
13271 ;          6531      end;
13272 ;          6532
13273 ;          6533  if .DODU_FLG IS_SET                     !DROP THIS UNIT IF DODU_FLG SET
13274 ;          6534  then
13275 ;          6535      begin
13276 ;          6536      DODU (.ML_LUN);
13277 ;          6537      DOCLN;
13278 ;          6538      end;
13279 ;          6539
13280 ;          6540  ENDTST;
13284
13285                                          .SBTTL  $T24
13289 045566  004167  136324          $T24:   JSR     R1,$SAVE5                ;                    6399
13290 045572  162706  000030                  SUB     #30,SP
13291 045576  152777  000040  145410          BISB    #40,@ML.REG+40           ;                    6437
13292 045604  016705  145772                  MOV     ML.DUT,R5
13293 045610  042705  177770                  BIC     #177770,R5
13294 045614  142777  000007  145372          BICB    #7,@ML.REG+40
13295 045622  150577  145366                  BISB    R5,@ML.REG+40
13296 045626  005066  000002                  CLR     2(SP)                    ; DODU.FLG           6440
```

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                                        ;ML4                                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                                       14-May-1981 13:05:08    PA:<
13298
13299
13300
13301 045632 152777 000040 145434       BISB    #40,@ML.REG+120                 ;                                                       6441
13302 045640 005002                     CLR     R2                              ; CHK.SUM.ERR                                           6442
13303 045642 012701 000016          1$: MOV     #16,R1                          ;                                                       6445
13304 045646 060601                     ADD     SP,R1                           ; OFF.SET.CNT,*
13305 045650 060201                     ADD     R2,R1                           ; CNT,*
13306 045652 105011                     CLRB    (R1)
13307 045654 005202                     INC     R2                              ; CNT                                                   6444
13308 045656 020227 000011              CMP     R2,#11                          ; CNT,*
13309 045662 003767                     BLE     1$
13310 045664 005005                     CLR     R5                              ; ADRS.CNT                                              6447
13311 045666 005066 000010          2$: CLR     10(SP)                          ; ROW.ORED.COL                                          6449
13312 045672 010566 000006              MOV     R5,6(SP)                        ; ADRS.CNT,PROM.ADRS                                    6450
13313 045676 005004                     CLR     R4                              ; TWICE                                                 6452
13314 045700 005066 000004          3$: CLR     4(SP)                           ; BAD.NIB.CNT                                           6454
13315 045704 005016                     CLR     (SP)                            ; ERR.FLG                                               6455
13316 045706 016677 000006 145340       MOV     6(SP),@ML.REG+100               ; PROM.ADRS,*                                           6456
13317 045714 012701 000001              MOV     #1,R1                           ; *,$$TMP2                                              6457
13318 045720 001411                 4$: BEQ     7$
13319 045722 016702 134170              MOV     L$DLY,R2                        ; *,$$TMP1
13320 045726 001404                     BEQ     6$
13321 045730 005066 000014          5$: CLR     14(SP)                          ; $$TMP
13322 045734 005302                     DEC     R2                              ; $$TMP1
13323 045736 001374                     BNE     5$
13324 045740 005301                 6$: DEC     R1                              ; $$TMP2
13325 045742 000766                     BR      4$
13326 045744 017766 145434 000012   7$: MOV     @ML.REG+230,12(SP)              ; *,R.C.SAV                                             6458
13327 045752 005002                     CLR     R2                              ; BIT.CNT                                               6460
13328 045754 010201                 8$: MOV     R2,R1                           ; BIT.CNT,*                                             6462
13329 045756 006201                     ASR     R1
13330 045760 006201                     ASR     R1
13331 045762 006201                     ASR     R1
13332 045764 012700 000012              MOV     #12,R0
13333 045770 060600                     ADD     SP,R0                           ; R.C.SAV,*
13334 045772 060001                     ADD     R0,R1
13335 045774 010146                     MOV     R1,-(SP)
13336 045776 010246                     MOV     R2,-(SP)                        ; BIT.CNT,*
13337 046000 042716 177770              BIC     #177770,(SP)
13338 046004 012746 000001              MOV     #1,-(SP)
13339 046010 005046                     CLR     -(SP)
13340 046012 004767 135122              JSR     PC,BL$GT2
13341 046016 062706 000010              ADD     #10,SP
13342 046022 005300                     DEC     R0
13343 046024 001002                     BNE     9$
13344 046026 005266 000004              INC     4(SP)                           ; BAD.NIB.CNT
13345 046032 005202                 9$: INC     R2                              ; BIT.CNT                                               6460
13346 046034 020227 000011              CMP     R2,#11                          ; BIT.CNT,*
13347 046040 003745                     BLE     8$
13348 046042 016603 000012              MOV     12(SP),R3                       ; R.C.SAV,CHK.SUM                                       6464
13349 046046 006203                     ASR     R3                              ; CHK.SUM
13350 046050 006203                     ASR     R3                              ; CHK.SUM
13351 046052 000303                     SWAB    R3                              ; CHK.SUM
13352 046054 042703 177770              BIC     #177770,R3                      ; *,CHK.SUM
```

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13354                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
13355                                   ;                                                       14-May-1981 13:05:08    PA:<
13356
13357 046060  132766  000040  000013          BITB    #40,13(SP)          ; *,R.C.SAV+1                                   6466
13358 046066  001401                          BEQ     10$
13359 046070  005203                          INC     R3                  ; CHK.SUM
13360 046072  132766  000100  000013  10$:    BITB    #100,13(SP)         ; *,R.C.SAV+1                                   6468
13361 046100  001401                          BEQ     11$
13362 046102  005203                          INC     R3                  ; CHK.SUM
13363 046104  005002                  11$:    CLR     R2                  ;                                               6470
13364 046106  105766  000013                  TSTB    13(SP)              ; R.C.SAV+1
13365 046112  100002                          BPL     12$
13366 046114  005202                          INC     R2
13367 046116  005203                          INC     R3                  ; CHK.SUM
13368 046120  006002                  12$:    ROR     R2                  ;                                               6472
13369 046122  103004                          BCC     13$
13370 046124  026603  000004                  CMP     4(SP),R3            ; BAD.NIB.CNT,CHK.SUM                           6476
13371 046130  002006                          BGE     15$
13372 046132  000403                          BR      14$
13373 046134  026603  000004          13$:    CMP     4(SP),R3            ; BAD.NIB.CNT,CHK.SUM                           6482
13374 046140  001402                          BEQ     15$
13375 046142  012716  000001          14$:    MOV     #1,(SP)             ; *,ERR.FLG
13376 046146  021627  000001          15$:    CMP     (SP),#1             ; ERR.FLG,*                                     6486
13377 046152  001044                          BNE     16$
13378 046154  104455                          TRAP    55                  ;                                               6489
13379 046156  000106                          .WORD   106
13380 046160  010672                          .WORD   INTER
13381 046162  024060                          .WORD   DUMPER
13382 046164  012746  010004                  MOV     #FNC.6,-(SP)        ;                                               6490
13383 046170  012746  006666                  MOV     #WRD.35,-(SP)
13384 046174  012746  006772                  MOV     #WRD.45,-(SP)
13385 046200  012746  006426                  MOV     #WRD.12,-(SP)
13386 046204  012746  006406                  MOV     #WRD.10,-(SP)
13387 046210  012746  010216                  MOV     #FNC.21,-(SP)
13388 046214  012746  006100                  MOV     #SIX.FMT,-(SP)
13389 046220  012746  000007                  MOV     #7,-(SP)
13390 046224  010600                          MOV     SP,R0               ; SP,*
13391 046226  104414                          TRAP    14
13392 046230  016616  000032                  MOV     32(SP),(SP)         ; R.C.SAV,*                                     6491
13393 046234  010346                          MOV     R3,-(SP)            ; CHK.SUM,*
13394 046236  012746  004676                  MOV     #FMT.10,-(SP)
13395 046242  012746  000003                  MOV     #3,-(SP)
13396 046246  010600                          MOV     SP,R0               ; SP,*
13397 046250  104414                          TRAP    14
13398 046252  012766  000001  000030          MOV     #1,30(SP)           ; *,DODU.FLG                                    6492
13399 046260  062706  000026                  ADD     #26,SP              ;                                               6488
13400 046264  056666  000012  000010  16$:    BIS     12(SP),10(SP)       ; R.C.SAV,ROW.ORED.COL                          6495
13401 046272  052766  002000  000006          BIS     #2000,6(SP)         ; *,PROM.ADRS                                   6496
13402 046300  005204                          INC     R4                  ; TWICE                                         6452
13403 046302  020427  000001                  CMP     R4,#1               ; TWICE,*
13404 046306  003002                          BGT     17$
13405 046310  000167  177364                  JMP     3$
13406 046314  005002                  17$:    CLR     R2                  ; INDEX                                         6499
13407 046316  010201                  18$:    MOV     R2,R1               ; INDEX,*                                       6501
13408 046320  006201                          ASR     R1
```

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13410                          ;ML4                                                    14-May-1981 13:48:54    TOPS
13411                          ;                                                       14-May-1981 13:05:08    PA:<
13412
13413 046322  006201                    ASR     R1
13414 046324  006201                    ASR     R1
13415 046326  012700  000010            MOV     #10,R0
13416 046332  060600                    ADD     SP,R0           ; ROW.ORED.COL,*
13417 046334  060001                    ADD     R0,R1
13418 046336  010146                    MOV     R1,-(SP)
13419 046340  010246                    MOV     R2,-(SP)        ; INDEX,*
13420 046342  042716  177770            BIC     #177770,(SP)
13421 046346  012746  000001            MOV     #1,-(SP)
13422 046352  005046                    CLR     -(SP)
13423 046354  004767  134560            JSR     PC,BL$GT2
13424 046360  062706  000010            ADD     #10,SP
13425 046364  005300                    DEC     R0
13426 046366  001005                    BNE     19$
13427 046370  012701  000016            MOV     #16,R1
13428 046374  060601                    ADD     SP,R1           ; OFF.SET.CNT,*
13429 046376  060201                    ADD     R2,R1           ; INDEX,*
13430 046400  105211                    INCB    (R1)
13431 046402  005202          19$:      INC     R2              ; INDEX                 6499
13432 046404  020227  000011            CMP     R2,#11          ; INDEX,*
13433 046410  003742                    BLE     18$
13434 046412  005205                    INC     R5              ; ADRS.CNT              6447
13435 046414  020527  000016            CMP     R5,#16          ; ADRS.CNT,*
13436 046420  003002                    BGT     20$
13437 046422  000167  177240            JMP     2$
13438 046426  005000          20$:      CLR     R0              ; CNT.14.BAD            6505
13439 046430  005001                    CLR     R1              ; CNT                   6507
13440 046432  012702  000016    21$:    MOV     #16,R2          ;                       6509
13441 046436  060602                    ADD     SP,R2           ; OFF.SET.CNT,*
13442 046440  060102                    ADD     R1,R2           ; CNT,*
13443 046442  121227  000016            CMPB    (R2),#16
13444 046446  103401                    BLO     22$
13445 046450  005200                    INC     R0              ; CNT.14.BAD
13446 046452  005201          22$:      INC     R1              ; CNT                   6507
13447 046454  020127  000011            CMP     R1,#11          ; CNT,*
13448 046460  003764                    BLE     21$
13449 046462  005700                    TST     R0              ; CNT.14.BAD            6511
13450 046464  001505                    BEQ     27$
13451 046466  104455                    TRAP    55              ;                       6514
13452 046470  000107                    .WORD   107
13453 046472  010570                    .WORD   ARR.DAT
13454 046474  024060                    .WORD   DUMPER
13455 046476  020027  000012            CMP     R0,#12          ; CNT.14.BAD,*          6516
13456 046502  001024                    BNE     23$
13457 046504  012746  006726            MOV     #WRD.40,-(SP)   ;                       6518
13458 046510  012746  006746            MOV     #WRD.42,-(SP)
13459 046514  012746  007054            MOV     #WRD.51,-(SP)
13460 046520  012746  007004            MOV     #WRD.46,-(SP)
13461 046524  012746  007104            MOV     #WRD.54,-(SP)
13462 046530  012746  007114            MOV     #WRD.55,-(SP)
13463 046534  012746  006100            MOV     #SIX.FMT,-(SP)
13464 046540  012746  000007            MOV     #7,-(SP)
```

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13466                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
13467                                   ;                                                       14-May-1981 13:05:08    PA:<
13468
13469 046544  010600                              MOV     SP,R0                   ; SP,*
13470 046546  104414                              TRAP    14
13471 046550  022626                              CMP     (SP)+,(SP)+
13472 046552  000445                              BR      26$                     ;                                       6516
13473 046554  012746  006726              23$:    MOV     #WRD.40,-(SP)           ;                                       6521
13474 046560  012746  006746                      MOV     #WRD.42,-(SP)
13475 046564  012746  007016                      MOV     #WRD.47,-(SP)
13476 046570  012746  007004                      MOV     #WRD.46,-(SP)
13477 046574  012746  006046                      MOV     #FOR.FMT,-(SP)
13478 046600  012746  000005                      MOV     #5,-(SP)
13479 046604  010600                              MOV     SP,R0                   ; SP,*
13480 046606  104414                              TRAP    14
13481 046610  005002                              CLR     R2                      ; CNT                                   6523
13482 046612  012701  000032              21$:    MOV     #32,R1                  ;                                       6525
13483 046616  060601                              ADD     SP,R1                   ; OFF.SET.CNT,*
13484 046620  060201                              ADD     R2,R1                   ; CNT,*
13485 046622  121127  000016                      CMPB    (R1),#16
13486 046626  103413                              BLO     25$
13487 046630  005046                              CLR     -(SP)
13488 046632  111116                              MOVB    (R1),(SP)
13489 046634  010246                              MOV     R2,-(SP)                ; CNT,*
13490 046636  012746  005034                      MOV     #FMT.13,-(SP)
13491 046642  012746  000003                      MOV     #3,-(SP)
13492 046646  010600                              MOV     SP,R0                   ; SP,*
13493 046650  104414                              TRAP    14
13494 046652  062706  000010                      ADD     #10,SP
13495 046656  005202                      25$:    INC     R2                      ; CNT                                   6523
13496 046660  020227  000011                      CMP     R2,#11                  ; CNT,*
13497 046664  003752                              BLE     24$
13498 046666  012766  000001  000016  26$:    MOV     #1,16(SP)               ; *,DODU.FLG                            6530
13499 046674  062706  000014                      ADD     #14,SP                  ;                                       6513
13500 046700  026627  000002  000001  27$:    CMP     2(SP),#1                ; DODU.FLG,*                            6533
13501 046706  001004                              BNE     28$
13502 046710  016700  144664                      MOV     ML.LUN,R0               ;                                       6536
13503 046714  104451                              TRAP    51
13504 046716  104444                              TRAP    44
13505 046720  062706  000030              28$:    ADD     #30,SP                  ;                                       6399
13506 046724  000207                              RTS     PC
13507
13508                                   ; Routine Size:  304 words
13509                                   ; Maximum stack depth per invocation:  29 words
13514
13515
13519
13520                                           .SBTTL  T24
```

```
13522                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
13523                                   ;                                                       14-May-1981 13:05:08    PA:<
13524
13528 046726                            T24::
13529 046726  004767  176634            1$:     JSR     PC,$T24                         ;                               6538
13530 046732  104466                            TRAP    66
13531 046734  006000                            ROR     R0
13532 046736  103773                            BLO     1$
13533 046740  000207                            RTS     PC
13534
13535                                   ; Routine Size:  6 words
13536                                   ; Maximum stack depth per invocation:  0 words
13541
13542
13543 ;         6541  !<BLF/PAGE>
```

```
13545 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
13546 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (75)
13547
13548 ;          6542  !
13549 ;          6543  !
13550 ;          6544  BGNTST;
13551 ;          6545
13552 ;          6546  !++
13553 ;          6547  ! TEST NUMBER:  TST 25
13554 ;          6548  !
13555 ;          6549  ! TEST NAME:    PROM OR FUNCTION TEST
13556 ;          6550  !
13557 ;          6551  ! TEST DESCRIPTION:
13558 ;          6552  !
13559 ;          6553  !       TEST THE HARDWARE ORING OF
13560 ;          6554  !       THE MEMORY ARRAYS' PROM
13561 ;          6555  !       ROW COLUMN DATA BY:
13562 ;          6556  !
13563 ;          6557  !       1.  READING AND STORING 128
13564 ;          6558  !           HARDWARE ORED ROW COLUMN
13565 ;          6559  !           DATA.
13566 ;          6560  !
13567 ;          6561  !       2.  THEN IN PROM DISABLE MODE
13568 ;          6562  !           AND VIA SOFTWARE CONTROL,
13569 ;          6563  !           READ AND OR PROM ROW
13570 ;          6564  !           COLUMN DATA AND COMPARE
13571 ;          6565  !           AGAINST THE RESPECTIVE
13572 ;          6566  !           STORED HARDWARE ORED DATA.
13573 ;          6567  !
13574 ;          6568  !--
13575 ;          6569
13576 ;          6570  local
13577 ;          6571      R_BITS,                         !PROM ROW DATA
13578 ;          6572      C_BITS,                         !PROM COL DATA
13579 ;          6573      SW_ORED,                        !SOFTWARE CALCULATED PROM ORED DATA
13580 ;          6574      HW_SAVE,                        !SOFTWARE  PROM ORED DATA
13581 ;          6575      DODU_FLG;                       !DROP UNIT FLAG
13582 ;          6576
13583 ;          6577  BGNSUB;
13584 ;          6578  CLR_MBUS;
13585 ;          6579  DODU_FLG = ZERO;
13586 ;          6580  DAT_DM = ONE;
13587 ;          6581  FIRST_BLK_XFER ();                  !SET UP A FIRST BLOCK XFER
13588 ;          6582  ML_FUNC = write;                    !DO A WRITE FUNCTION
13589 ;          6583
13590 ;          6584  incr PROM_ADRS from 0 to 127 do     !READ AND STORE 128 HARDWARE PROM ORED DATA
13591 ;          6585      begin
13592 ;          6586      DELAY (ONE_US);
13593 ;          6587      HW_OR_TBL [.PROM_ADRS] = .MLPD;  !READ HARDWARE PROM ORED DATA
13594 ;          6588      DAT_CLK = ONE;                  !CLOCK NEXT ONE OUT
13595 ;          6589      end;
13596 ;          6590
13597 ;          6591  CLR_MBUS;
13598 ;          6592  PROM_DIS = ONE;                     !SET PROM DISABLE MODE
13599 ;          6593
```

```
13601 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
13602 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (75)
13603
13604 ;          6594  incr PROM_ADRS from 0 to 127 do        !CALCULATE 128 SW ORED DATA & COMPARE TO HW TABLE
13605 ;          6595      begin
13606 ;          6596      MLPA = .PROM_ADRS;                !LOADING MLPA INITIATES A PROM READ
13607 ;          6597      DELAY (ONE_US);
13608 ;          6598      R_BITS = .MLPD;                   !SAVE ROW DATA
13609 ;          6599      MLPA = .PROM_ADRS or %o'2000';    !ENABLE COLUMN DATA ADRS
13610 ;          6600      DELAY (ONE_US);
13611 ;          6601      C_BITS = .MLPD;                   !SAVE COL DATA
13612 ;          6602      SW_ORED = .R_BITS or .C_BITS;     !CALCULATE SOFTWARE ORED
13613 ;          6603      HW_SAVE = .HW_OR_TBL [.PROM_ADRS];!GET RESPECTIVE HARDWARE ORED
13614 ;          6604
13615 ;          6605      if (.HW_SAVE<0, 9>) neq (.SW_ORED<0, 9>)    !COMPARE SW & HW ORED
13616 ;          6606      then
13617 ;          6607          begin                         !IF NEQ THEN ERROR
13618 ;          6608          ERRDF (76, ARR_DAT, DUMPER);
13619 ;          6609          PRINTB (FOR_FMT, WRD_35, WRD_36, WRD_19, PHR_4);
13620 ;          6610          PRINTB (FMT_2, .SW_ORED<0, 9>, .HW_SAVE<0, 9>, (.SW_ORED<0, 9> xor .HW_SAVE<0, 9>));
13621 ;          6611          DODU_FLG = ONE;
13622 ;          6612          end;
13623 ;          6613
13624 ;          6614      end;
13625 ;          6615
13626 ;          6616  ENDSUB;
13627 ;          6617  if .DODU_FLG IS_SET                   !DROP THIS UNIT IF DODU FLG IS_SET
13628 ;          6618  then
13629 ;          6619      begin
13630 ;          6620      DODU (.ML_LUN);
13631 ;          6621      DOCLN;
13632 ;          6622      end;
13633 ;          6623
13634 ;          6624  ENDTST;
13638
13639                                        .SBTTL  $T25
13643 046742 004167 135150          $T25:   JSR     R1,$SAVE5          ;                    6540
13644 046746 162706 000010                  SUB     #10,SP
13645 046752 104402                 1$:     TRAP    2                  ;                    6575
13646 046754 152777 000040 144232           BISB    #40,@ML.REG+40     ;                    6577
13647 046762 016705 144614                  MOV     ML.DUT,R5
13648 046766 042705 177770                  BIC     #177770,R5
13649 046772 142777 000007 144214           BICB    #7,@ML.REG+40
13650 047000 150577 144210                  BISB    R5,@ML.REG+40
13651 047004 005016                         CLR     (SP)               ; DODU.FLG           6579
13652 047006 152777 000010 144260           BISB    #10,@ML.REG+120    ;                    6580
13653 047014 004767 147020                  JSR     PC,FIRST.BLK.XFER  ;                    6581
13654 047020 142777 000077 144126           BICB    #77,@ML.REG        ;                    6582
13655 047026 152777 000061 144120           BISB    #61,@ML.REG
```

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13657                          ;ML4                                                    14-May-1981 13:48:54    TOPS
13658                          ;                                                       14-May-1981 13:05:08    PA:<
13659
13660 047034  005004                        CLR     R4                      ; PROM.ADRS                             6584
13661 047036  012703  000001          2$:   MOV     #1,R3                   ; *,$$TMP2                              6586
13662 047042  001411                3$:   BEQ     6$
13663 047044  016705  133046              MOV     L$DLY,R5                ; *,$$TMP1
13664 047050  001404                        BEQ     5$
13665 047052  005066  000006          4$:   CLR     6(SP)                   ; $$TMP
13666 047056  005305                        DEC     R5                      ; $$TMP1
13667 047060  001374                        BNE     4$
13668 047062  005303                5$:   DEC     R3                      ; $$TMP2
13669 047064  000766                        BR      3$
13670 047066  010405                6$:   MOV     R4,R5                   ; PROM.ADRS,*                           6587
13671 047070  006305                        ASL     R5
13672 047072  017765  144306  011160        MOV     @ML.REG+230,HW.OR.TBL(R5)
13673 047100  152777  000020  144166        BISB    #20,@ML.REG+120         ;                                       6588
13674 047106  005204                        INC     R4                      ; PROM.ADRS                             6584
13675 047110  020427  000177                CMP     R4,#177                 ; PROM.ADRS,*
13676 047114  003750                        BLE     2$
13677 047116  152777  000040  144070        BISB    #40,@ML.REG+40          ;                                       6589
13678 047124  016705  144452                MOV     ML.DUT,R5
13679 047130  042705  177770                BIC     #177770,R5
13680 047134  142777  000007  144052        BICB    #7,@ML.REG+40
13681 047142  150577  144046                BISB    R5,@ML.REG+40
13682 047146  152777  000040  144120        BISB    #40,@ML.REG+120         ;                                       6592
13683 047154  005003                        CLR     R3                      ; PROM.ADRS                             6594
13684 047156  010377  144072          7$:   MOV     R3,@ML.REG+100          ; PROM.ADRS,*                           6596
13685 047162  012704  000001                MOV     #1,R4                   ; *,$$TMP2                              6597
13686 047166  001411                8$:   BEQ     11$
13687 047170  016705  132722                MOV     L$DLY,R5                ; *,$$TMP1
13688 047174  001404                        BEQ     10$
13689 047176  005066  000006          9$:   CLR     6(SP)                   ; $$TMP
13690 047202  005305                        DEC     R5                      ; $$TMP1
13691 047204  001374                        BNE     9$
13692 047206  005304                10$:  DEC     R4                      ; $$TMP2
13693 047210  000766                        BR      8$
13694 047212  017766  144166  000004  11$:  MOV     @ML.REG+230,4(SP)       ; *,R.BITS                              6598
13695 047220  010305                        MOV     R3,R5                   ; PROM.ADRS,*                           6599
13696 047222  052705  002000                BIS     #2000,R5
13697 047226  010577  144022                MOV     R5,@ML.REG+100
13698 047232  012704  000001                MOV     #1,R4                   ; *,$$TMP2                              6600
13699 047236  001411                12$:  BEQ     15$
13700 047240  016705  132652                MOV     L$DLY,R5                ; *,$$TMP1
13701 047244  001404                        BEQ     14$
13702 047246  005066  000006          13$:  CLR     6(SP)                   ; $$TMP
13703 047252  005305                        DEC     R5                      ; $$TMP1
13704 047254  001374                        BNE     13$
13705 047256  005304                14$:  DEC     R4                      ; $$TMP2
13706 047260  000766                        BR      12$
13707 047262  017766  144116  000002  15$:  MOV     @ML.REG+230,2(SP)       ; *,C.BITS                              6601
13708 047270  016601  000004                MOV     4(SP),R1                ; R.BITS,SW.ORED                        6602
13709 047274  056601  000002                BIS     2(SP),R1                ; C.BITS,SW.ORED
13710 047300  010305                        MOV     R3,R5                   ; PROM.ADRS,*                           6603
13711 047302  006305                        ASL     R5
```

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13713                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
13714                                   ;                                                       14-May-1981 13:05:08    PA:<
13715
13716 047304  016502  011160                     MOV     HW.OR.TBL(R5),R2        ; *,HW.SAVE
13717 047310  010104                             MOV     R1,R4                   ; SW.ORED,*                             6605
13718 047312  042704  177000                     BIC     #177000,R4
13719 047316  010205                             MOV     R2,R5                   ; HW.SAVE,*
13720 047320  042705  177000                     BIC     #177000,R5
13721 047324  020504                             CMP     R5,R4
13722 047326  001451                             BEQ     16$
13723 047330  104455                             TRAP    55                      ;                                       6608
13724 047332  000114                             .WORD   114
13725 047334  010570                             .WORD   ARR.DAT
13726 047336  024060                             .WORD   DUMPER
13727 047340  012746  007454                     MOV     #PHR.4,-(SP)            ;                                       6609
13728 047344  012746  006506                     MOV     #WRD.19,-(SP)
13729 047350  012746  006674                     MOV     #WRD.36,-(SP)
13730 047354  012746  006666                     MOV     #WRD.35,-(SP)
13731 047360  012746  006046                     MOV     #FOR.FMT,-(SP)
13732 047364  012746  000005                     MOV     #5,-(SP)
13733 047370  010600                             MOV     SP,R0                   ; SP,*
13734 047372  104414                             TRAP    14
13735 047374  010205                             MOV     R2,R5                   ; HW.SAVE,*                             6610
13736 047376  010116                             MOV     R1,(SP)                 ; SW.ORED,*
13737 047400  010504                             MOV     R5,R4
13738 047402  040104                             BIC     R1,R4
13739 047404  040516                             BIC     R5,(SP)
13740 047406  050416                             BIS     R4,(SP)
13741 047410  010246                             MOV     R2,-(SP)                ; HW.SAVE,*
13742 047412  042716  177000                     BIC     #177000,(SP)
13743 047416  010146                             MOV     R1,-(SP)                ; SW.ORED,*
13744 047420  042716  177000                     BIC     #177000,(SP)
13745 047424  012746  004266                     MOV     #FMT.2,-(SP)
13746 047430  012746  000004                     MOV     #4,-(SP)
13747 047434  010600                             MOV     SP,R0                   ; SP,*
13748 047436  104414                             TRAP    14
13749 047440  012766  000001  000024             MOV     #1,24(SP)               ; *,DODU.FLG                            6611
13750 047446  062706  000024                     ADD     #24,SP                  ;                                       6607
13751 047452  005203                 16$:        INC     R3                      ; PROM.ADRS                             6594
13752 047454  020327  000177                     CMP     R3,#177                 ; PROM.ADRS,*
13753 047460  003636                             BLE     7$
13754 047462  104467                             TRAP    67                      ;                                       6614
13755 047464  006000                             ROR     R0
13756 047466  103002                             BHIS    17$
13757 047470  000167  177256                     JMP     1$
13758 047474  021627  000001             17$:    CMP     (SP),#1                 ; DODU.FLG,*                            6617
13759 047500  001004                             BNE     18$
13760 047502  016700  144072                     MOV     ML.LUN,R0               ;                                       6620
13761 047506  104451                             TRAP    51
13762 047510  104444                             TRAP    44
13763 047512  062706  000010             18$:    ADD     #10,SP                  ;                                       6540
13764 047516  000207                             RTS     PC
13765
13766                                   ; Routine Size:  183 words
13767                                   ; Maximum stack depth per invocation:  20 words
```

```
 13769                                  ;ML4                                                    14-May-1981 13:48:54    TOPS
 13770                                  ;                                                       14-May-1981 13:05:08    PA:<
 13771
 13776
 13777
 13781
 13782                                          .SBTTL  T25
 13786 047520                           T25::
 13787 047520  004767  177216           1$:     JSR     PC,$T25                         ;                               6622
 13788 047524  104466                           TRAP    66
 13789 047526  006000                           ROR     R0
 13790 047530  103773                           BLO     1$
 13791 047532  000207                           RTS     PC
 13792
 13793                                  ; Routine Size:  6 words
 13794                                  ; Maximum stack depth per invocation:  0 words
 13799
 13800
 13801 ;          6625  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (76)

```
13803 ;ML4
13804 ;
13805
13806 ;          6626  !
13807 ;          6627  !
13808 ;          6628  BGNTST;
13809 ;          6629
13810 ;          6630  !++
13811 ;          6631  ! TEST NUMBER:  TST 26
13812 ;          6632  !
13813 ;          6633  ! TEST NAME:    UV ADRS ERROR TEST
13814 ;          6634  !
13815 ;          6635  ! TEST DESCRIPTION:
13816 ;          6636  !
13817 ;          6637  !       TEST THE DETECTION OF UV ADRS
13818 ;          6638  !       ERRORS BY:
13819 ;          6639  !
13820 ;          6640  !       1.  GENERATING PROM DATA PATTERN
13821 ;          6641  !           FROM 0 TO %O'177777' AND
13822 ;          6642  !           DETERMINE WHETHER RESPECTIVE
13823 ;          6643  !           PATTERN IS GOOD/OR BAD
13824 ;          6644  !           PROM DATA.
13825 ;          6645  !
13826 ;          6646  !       2.  VIA DAT_DM AND PROM R/W
13827 ;          6647  !           MODES PRESENT GENERATED
13828 ;          6648  !           PROM DATA TO THE UV ADRS
13829 ;          6649  !           ERR PROM.
13830 ;          6650  !
13831 ;          6651  !       3.  TEST ERROR CONDITIONS FOR
13832 ;          6652  !           CORRECT RESPONCE TO GOOD/
13833 ;          6653  !           OR BAD PROM DATA.
13834 ;          6654  !
13835 ;          6655  !--
13836 ;          6656
13837 ;          6657  local
13838 ;          6658      DODU_FLG,                          !DROP UNIT FLAG
13839 ;          6659      HIGH_CNT,                          !STORES PROM DATA CHECK SUM BITS
13840 ;          6660      PROM_DATA : bitvector [16],        !STORES PROM DATA
13841 ;          6661      LOW_CNT,                           !STORES SUM OF PROM DATA BITS <9:0>
13842 ;          6662      TEMP,                              !TEMPORARY STORAGE
13843 ;          6663      ERR_FLG,                           !ERROR FLAG
13844 ;          6664      GTR_FLG;                           !SETS WHEN PROM DATA BIT 15 IS A ONE
13845 ;          6665
13846 ;          6666  DODU_FLG = ZERO;
13847 ;          6667  PROM_DATA = -1;
13848 ;          6668
13849 ;          6669  do                                     !TEST ALL POSSIBLE PROM DATA COMBINATIONS
13850 ;          6670      begin
13851 ;          6671      PROM_DATA = .PROM_DATA + 1;        !INCREMENT PROM_DATA
13852 ;          6672      BGNSUB;
13853 ;          6673      CLR_MBUS;
13854 ;          6674      ERR_FLG = ZERO;
13855 ;          6675      LOW_CNT = ZEROES;
13856 ;          6676      HIGH_CNT = ZEROES;
13857 ;          6677      GTR_FLG = ZERO;
```

```
13859 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
13860 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (76)
13861
13862 ;          6678
13863 ;          6679        incr BIT_CNT from 0 to 9 do                  !COUNT PROM DATA BITS <9:0>
13864 ;          6680
13865 ;          6681            if .PROM_DATA [.BIT_CNT] IS_SET then LOW_CNT = .LOW_CNT + 1;
13866 ;          6682
13867 ;          6683        HIGH_CNT = .PROM_DATA<10, 3>;                !GET PROM DATA CHECK SUM BITS
13868 ;          6684
13869 ;          6685        if .PROM_DATA [13] IS_SET then HIGH_CNT = .HIGH_CNT + 1;    !ADD IN BIT 13 IF SET
13870 ;          6686
13871 ;          6687        if .PROM_DATA [14] IS_SET then HIGH_CNT = .HIGH_CNT + 1;    !ADD IN BIT 14 IF SET
13872 ;          6688
13873 ;          6689        if .PROM_DATA [15] IS_SET then HIGH_CNT = .HIGH_CNT + 1;    !ADD IN BIT 15 IF SET
13874 ;          6690
13875 ;          6691        if .PROM_DATA [15] IS_SET then GTR_FLG = ONE;       !SET FLAG IF BIT 15 IS SET
13876 ;          6692
13877 ;          6693        DAT_DM_XFER ();                              !SET UP A DATA DIAG MODE XFERR
13878 ;          6694        PROM_RW = ONE;                               !SET PROM READ WRITE
13879 ;          6695        MLPD = .PROM_DATA;                           !LOAD MLPD WITH PROM_DATA
13880 ;          6696        MLCS1 = write;                               !DO A WRITE FUNCTION
13881 ;          6697        DAT_CLK = ONE;                               !CLOCK PROM DATA INTO UV PROM
13882 ;          6698
13883 ;          6699        if .UNS IS_SET                               !SEE IF PROM DATA CAUSED A UV ERROR
13884 ;          6700        then
13885 ;          6701            begin
13886 ;          6702
13887 ;          6703            if .GTR_FLG IS_SET                       !UNS IS_SET. SEE IF GTR FLG IS SET
13888 ;          6704            then
13889 ;          6705                begin
13890 ;          6706                TEMP = .PROM_DATA;                   !LOAD TEMP WITH PROM DATA
13891 ;          6707                TEMP = .TEMP and %o'162000';         !SEE IF THESE BITS ARE SET IN PROM DATA
13892 ;          6708
13893 ;          6709                if .TEMP eql %o'162000'              !THESE BITS SET AUTOMATICALLY CAUSE A UNS
13894 ;          6710                then
13895 ;          6711                    begin
13896 ;          6712
13897 ;          6713                    if .LOW_CNT geq .HIGH_CNT        !LOW<9:0> SHOULD BE ISS THAN THE HIGH<15:10> IF GTR FLG IS S
13898 ;          6714                    then
13899 ;          6715                        begin                        !ERROR IF LOW<9:0> IS GEQ HIGH<15:10>
13900 ;          6716                        ERRDF (72, ARR_DAT, DUMPER);
13901 ;          6717                        PRINTB (SIX_FMT, WRD_34, PHR_5, WRD_32, WRD_6, WRD_33, WRD_24);
13902 ;          6718                        ERR_FLG = ONE;
13903 ;          6719                        end;
13904 ;          6720
13905 ;          6721                    end;
13906 ;          6722
13907 ;          6723                end
13908 ;          6724            else                                     !GTR FLG IS NOT SET
13909 ;          6725                begin
13910 ;          6726
13911 ;          6727                if .LOW_CNT eql .HIGH_CNT            !LOW<9:0> SHOULD BE NEQ HIGH<15:10>
13912 ;          6728                then
13913 ;          6729                    begin                            !ERROR IF EQL
```

```
:ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
:                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (76)

:          6730                 ERRDF (73, ARR_DAT, DUMPER);
:          6731                 PRINTB (SIX_FMT, WRD_34, PHR_5, WRD_32, WRD_6, WRD_33, WRD_24);
:          6732                 ERR_FLG = ONE;
:          6733                 end;
:          6734
:          6735             end
:          6736
:          6737         end
:          6738     else                                       !UNS WAS NOT SET
:          6739         begin
:          6740
:          6741         if .GTR_FLG IS_SET                     !SEE IF GTR FLG IS_SET
:          6742         then
:          6743             begin
:          6744             TEMP = .PROM_DATA;                 !LOAD TEMP WITH PROM DATA
:          6745             TEMP = .TEMP and %o'162000';       !SEE IF THESE BITS ARE SET IN PROM DATA
:          6746
:          6747             if .TEMP neq %o'162000'            !IF THESE BITS ARE SET THEN UNS SHOULD BE SET
:          6748             then
:          6749                 begin                          !ERROR UNS IS NOT SET
:          6750                 ERRDF (74, ARR_DAT, DUMPER);
:          6751                 PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
:          6752                 ERR_FLG = ONE;
:          6753                 end
:          6754             else                               !BITS 162000 ARE NOT SET
:          6755                 begin
:          6756
:          6757                 if .LOW_CNT lss .HIGH_CNT      !LOW<9:0> SHOULD BE GEQ HIGH<15:10>
:          6758                 then
:          6759                     begin                      !ERROR IF LSS
:          6760                     ERRDF (75, ARR_DAT, DUMPER);
:          6761                     PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
:          6762                     ERR_FLG = ONE;
:          6763                     end;
:          6764
:          6765                 end
:          6766
:          6767             end
:          6768         else                                   !GTR_FLG IS NOT SET
:          6769             begin
:          6770
:          6771             if .LOW_CNT neq .HIGH_CNT          !LOW<9:0> SHOULD EQL HIGH<15:10>
:          6772             then
:          6773                 begin                          !ERROR IF NEQ
:          6774                 ERRDF (108, ARR_DAT, DUMPER);
:          6775                 PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
:          6776                 ERR_FLG = ONE;
:          6777                 end
:          6778
:          6779             end
:          6780
:          6781         end;
```

```
 13971 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 13972 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (76)
 13973
 13974 ;          6782
 13975 ;          6783      if .ERR_FLG IS_SET                 !SEE IF ERROR FLG GOT SET
 13976 ;          6784      then
 13977 ;          6785          begin                          !PRINT FAILING PROM_DATA AND SET DODU_FLG
 13978 ;          6786          PRINTB (FMT_7, .PROM_DATA);
 13979 ;          6787          DODU_FLG = ONE;
 13980 ;          6788          end;
 13981 ;          6789
 13982 ;          6790      ENDSUB;
 13983 ;          6791      end
 13984 ;          6792  until .PROM_DATA eql %o'177777';        !TRY ALL BIT COMBINATIONS
 13985 ;          6793
 13986 ;          6794  if .DODU_FLG IS_SET                     !DROP THIS UNIT IF DODU_FLG IS SET
 13987 ;          6795  then
 13988 ;          6796      begin
 13989 ;          6797      DODU (.ML_LUN);
 13990 ;          6798      DOCLN;
 13991 ;          6799      end;
 13992 ;          6800
 13993 ;          6801  ENDTST;
 13997
 13998                                          .SBTTL  $T26
 14002 047534  004167  134356          $T26:   JSR     R1,$SAVE5                       ;                       6624
 14003 047540  162706  000012                  SUB     #12,SP
 14004 047544  005066  000006                  CLR     6(SP)                           ; DODU.FLG              6666
 14005 047550  012766  177777  000010          MOV     #-1,10(SP)                      ; *,PROM.DATA           6667
 14006 047556  005266  000010          1$:     INC     10(SP)                          ; PROM.DATA             6671
 14007 047562  104402                  2$:     TRAP    2
 14008 047564  152777  000040  143422          BISB    #40,@ML.REG+40                  ;                       6672
 14009 047572  016705  144004                  MOV     ML.DUT,R5
 14010 047576  042705  177770                  BIC     #177770,R5
 14011 047602  142777  000007  143404          BICB    #7,@ML.REG+40
 14012 047610  150577  143400                  BISB    R5,@ML.REG+40
 14013 047614  005001                          CLR     R1                              ; ERR.FLG               6674
 14014 047616  005066  000002                  CLR     2(SP)                           ; LOW.CNT               6675
 14015 047622  005003                          CLR     R3                              ; HIGH.CNT              6676
 14016 047624  005066  000004                  CLR     4(SP)                           ; GTR.FLG               6677
 14017 047630  005005                          CLR     R5                              ; BIT.CNT               6679
 14018 047632  010504                  3$:     MOV     R5,R4                           ; BIT.CNT,*             6681
 14019 047634  006204                          ASR     R4
 14020 047636  006204                          ASR     R4
 14021 047640  006204                          ASR     R4
 14022 047642  012702  000010                  MOV     #10,R2
 14023 047646  060602                          ADD     SP,R2                           ; PROM.DATA,*
 14024 047650  060204                          ADD     R2,R4
 14025 047652  010446                          MOV     R4,-(SP)
```

```
14027                                ;ML4                                                    14-May-1981 13:48:54    TOPS
14028                                ;                                                       14-May-1981 13:05:08    PA:<
14029
14030 047654  010546                       MOV     R5,-(SP)          ; BIT.CNT,*
14031 047656  042716  177770                BIC     #177770,(SP)
14032 047662  012746  000001                MOV     #1,-(SP)
14033 047666  005046                       CLR     -(SP)
14034 047670  004767  133244                JSR     PC,BL$GT2
14035 047674  062706  000010                ADD     #10,SP
14036 047700  005300                       DEC     R0
14037 047702  001002                       BNE     4$
14038 047704  005266  000002                INC     2(SP)             ; LOW.CNT
14039 047710  005205                4$:    INC     R5                ; BIT.CNT                6679
14040 047712  020527  000011              CMP     R5,#11            ; BIT.CNT,*
14041 047716  003745                       BLE     3$
14042 047720  016603  000010              MOV     10(SP),R3         ; PROM.DATA,HIGH.CNT     6683
14043 047724  006203                       ASR     R3                ; HIGH.CNT
14044 047726  006203                       ASR     R3                ; HIGH.CNT
14045 047730  000303                       SWAB    R3                ; HIGH.CNT
14046 047732  042703  177770              BIC     #177770,R3        ; *,HIGH.CNT
14047 047736  132766  000040  000011      BITB    #40,11(SP)        ; *,PROM.DATA+1          6685
14048 047744  001401                       BEQ     5$
14049 047746  005203                       INC     R3                ; HIGH.CNT
14050 047750  132766  000100  000011  5$: BITB    #100,11(SP)       ; *,PROM.DATA+1          6687
14051 047756  001401                       BEQ     6$
14052 047760  005203                       INC     R3                ; HIGH.CNT
14053 047762  005005                6$:    CLR     R5                ;                        6689
14054 047764  105766  000011              TSTB    11(SP)            ; PROM.DATA+1
14055 047770  100002                       BPL     7$
14056 047772  005205                       INC     R5
14057 047774  005203                       INC     R3                ; HIGH.CNT
14058 047776  006005                7$:    ROR     R5                ;                        6691
14059 050000  103003                       BCC     8$
14060 050002  012766  000001  000004      MOV     #1,4(SP)          ; *,GTR.FLG
14061 050010  004767  144146          8$: JSR     PC,DAT.DM.XFER    ;                        6693
14062 050014  152777  000100  143252      BISB    #100,@ML.REG+120  ;                        6694
14063 050022  016605  000010              MOV     10(SP),R5         ; PROM.DATA,*            6695
14064 050026  010577  143352              MOV     R5,@ML.REG+230
14065 050032  012777  000061  143114      MOV     #61,@ML.REG       ;                        6696
14066 050040  152777  000020  143226      BISB    #20,@ML.REG+120   ;                        6697
14067 050046  032777  040000  143160      BIT     #40000,@ML.REG+60 ;                        6699
14068 050054  001500                       BEQ     12$
14069 050056  026627  000004  000001      CMP     4(SP),#1          ; GTR.FLG,*              6703
14070 050064  001042                       BNE     11$
14071 050066  010516                       MOV     R5,(SP)           ; *,TEMP                 6706
14072 050070  042716  015777              BIC     #15777,(SP)       ; *,TEMP                 6707
14073 050074  021627  162000              CMP     (SP),#-16000      ; TEMP,*                 6709
14074 050100  001003                       BNE     9$
14075 050102  026603  000002              CMP     2(SP),R3          ; LOW.CNT,HIGH.CNT       6713
14076 050106  002002                       BGE     10$
14077 050110  000167  000422          9$: JMP     16$
14078 050114  104455                10$:   TRAP    55                ;                        6716
14079 050116  000110                       .WORD   110
14080 050120  010570                       .WORD   ARR.DAT
14081 050122  024060                       .WORD   DUMPER
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                                                                                                6717
050124  012746  006552                MOV     #WRD.24,-(SP)           ;
050130  012746  006654                MOV     #WRD.33,-(SP)
050134  012746  006336                MOV     #WRD.6,-(SP)
050140  012746  006646                MOV     #WRD.32,-(SP)
050144  012746  007472                MOV     #PHR.5,-(SP)
050150  012746  006660                MOV     #WRD.34,-(SP)
050154  012746  006100                MOV     #SIX.FMT,-(SP)
050160  012746  000007                MOV     #7,-(SP)
050164  010600                       MOV     SP,R0                   ; SP,*
050166  104414                       TRAP    14
050170  000556                       BR      15$                     ;               6718
050172  026603  000002        11$:    CMP     2(SP),R3                ; LOW.CNT,HIGH.CNT 6727
050176  001157                       BNE     16$
050200  104455                       TRAP    55                      ;               6730
050202  000111                       .WORD   111
050204  010570                       .WORD   ARR.DAT
050206  024060                       .WORD   DUMPER
050210  012746  006552                MOV     #WRD.24,-(SP)           ;               6731
050214  012746  006654                MOV     #WRD.33,-(SP)
050220  012746  006336                MOV     #WRD.6,-(SP)
050224  012746  006646                MOV     #WRD.32,-(SP)
050230  012746  007472                MOV     #PHR.5,-(SP)
050234  012746  006660                MOV     #WRD.34,-(SP)
050240  012746  006100                MOV     #SIX.FMT,-(SP)
050244  012746  000007                MOV     #7,-(SP)
050250  010600                       MOV     SP,R0                   ; SP,*
050252  104414                       TRAP    14
050254  000524                       BR      15$                     ;               6732
050256  026627  000004  000001  12$:  CMP     4(SP),#1                ; GTR.FLG,*     6741
050264  001067                       BNE     14$
050266  010516                       MOV     R5,(SP)                 ; *,TEMP        6744
050270  042716  015777                BIC     #15777,(SP)             ; *,TEMP        6745
050274  021627  162000                CMP     (SP),#-16000            ; TEMP,*        6747
050300  001427                       BEQ     13$
050302  104455                       TRAP    55                      ;               6750
050304  000112                       .WORD   112
050306  010570                       .WORD   ARR.DAT
050310  024060                       .WORD   DUMPER
050312  012746  006552                MOV     #WRD.24,-(SP)           ;               6751
050316  012746  006654                MOV     #WRD.33,-(SP)
050322  012746  006330                MOV     #WRD.5,-(SP)
050326  012746  006646                MOV     #WRD.32,-(SP)
050332  012746  007366                MOV     #PHR.1,-(SP)
050336  012746  006660                MOV     #WRD.34,-(SP)
050342  012746  006100                MOV     #SIX.FMT,-(SP)
050346  012746  000007                MOV     #7,-(SP)
050352  010600                       MOV     SP,R0                   ; SP,*
050354  104414                       TRAP    14
050356  000463                       BR      15$                     ;               6752
050360  026603  000002        13$:    CMP     2(SP),R3                ; LOW.CNT,HIGH.CNT 6757
050364  002064                       BGE     16$
050366  104455                       TRAP    55                      ;               6760
```

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14139                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
14140                                   ;                                                       14-May-1981 13:05:08    PA:<
14141
14142 050370  000113                            .WORD   113
14143 050372  010570                            .WORD   ARR.DAT
14144 050374  024060                            .WORD   DUMPER
14145 050376  012746  006552                    MOV     #WRD.24,-(SP)           ;                               6761
14146 050402  012746  006654                    MOV     #WRD.33,-(SP)
14147 050406  012746  006330                    MOV     #WRD.5,-(SP)
14148 050412  012746  006646                    MOV     #WRD.32,-(SP)
14149 050416  012746  007366                    MOV     #PHR.1,-(SP)
14150 050422  012746  006660                    MOV     #WRD.34,-(SP)
14151 050426  012746  006100                    MOV     #SIX.FMT,-(SP)
14152 050432  012746  000007                    MOV     #7,-(SP)
14153 050436  010600                            MOV     SP,R0                   ; SP,*
14154 050440  104414                            TRAP    14
14155 050442  000431                            BR      15$                     ;                               6762
14156 050444  026603  000002          14$:      CMP     2(SP),R3                ; LOW.CNT,HIGH.CNT              6771
14157 050450  001432                            BEQ     16$
14158 050452  104455                            TRAP    55                      ;                               6774
14159 050454  000154                            .WORD   154
14160 050456  010570                            .WORD   ARR.DAT
14161 050460  024060                            .WORD   DUMPER
14162 050462  012746  006552                    MOV     #WRD.24,-(SP)           ;                               6775
14163 050466  012746  006654                    MOV     #WRD.33,-(SP)
14164 050472  012746  006330                    MOV     #WRD.5,-(SP)
14165 050476  012746  006646                    MOV     #WRD.32,-(SP)
14166 050502  012746  007366                    MOV     #PHR.1,-(SP)
14167 050506  012746  006660                    MOV     #WRD.34,-(SP)
14168 050512  012746  006100                    MOV     #SIX.FMT,-(SP)
14169 050516  012746  000007                    MOV     #7,-(SP)
14170 050522  010600                            MOV     SP,R0                   ; SP,*
14171 050524  104414                            TRAP    14
14172 050526  012701  000001          15$:      MOV     #1,R1                   ; *,ERR.FLG                     6776
14173 050532  062706  000020                    ADD     #20,SP                  ;                               6773
14174 050536  020127  000001          16$:      CMP     R1,#1                   ; ERR.FLG,*                     6783
14175 050542  001014                            BNE     17$
14176 050544  010546                            MOV     R5,-(SP)                ;                               6786
14177 050546  012746  004562                    MOV     #FMT.7,-(SP)
14178 050552  012746  000002                    MOV     #2,-(SP)
14179 050556  010600                            MOV     SP,R0                   ; SP,*
14180 050560  104414                            TRAP    14
14181 050562  012766  000001  000014            MOV     #1,14(SP)               ; *,DODU.FLG                    6787
14182 050570  062706  000006                    ADD     #6,SP                   ;                               6785
14183 050574  104467                  17$:      TRAP    67                      ;                               6788
14184 050576  006000                            ROR     R0
14185 050600  103002                            BHIS    18$
14186 050602  000167  176754                    JMP     2$
14187 050606  005205                  18$:      INC     R5                      ;                               6792
14188 050610  001402                            BEQ     19$
14189 050612  000167  176740                    JMP     1$
14190 050616  026627  000006  000001  19$:      CMP     6(SP),#1                ; DODU.FLG,*                    6794
14191 050624  001004                            BNE     20$
14192 050626  016700  142746                    MOV     ML.LUN,R0               ;                               6797
14193 050632  104451                            TRAP    51
```

```
14195                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
14196                                   ;                                                       14-May-1981 13:05:08    PA:<
14197
14198 050634  104444                              TRAP    44
14199 050636  062706  000012              20$:    ADD     #12,SP                          ;                               6624
14200 050642  000207                              RTS     PC
14201
14202                                   ; Routine Size:  292 words
14203                                   ; Maximum stack depth per invocation:  19 words
14208
14209
14213
14214                                             .SBTTL  T26
14218 050644                            T26::
14219 050644  004767  176664              1$:     JSR     PC,$T26                         ;                               6799
14220 050650  104466                              TRAP    66
14221 050652  006000                              ROR     R0
14222 050654  103773                              BLO     1$
14223 050656  000207                              RTS     PC
14224
14225                                   ; Routine Size:  6 words
14226                                   ; Maximum stack depth per invocation:  0 words
14231
14232
14233 ;          6802  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (77)

```
14235 ;ML4
14236 ;
14237
14238 ;          6803  !
14239 ;          6804  !
14240 ;          6805  BGNTST;
14241 ;          6806
14242 ;          6807  !++
14243 ;          6808  ! TEST NUMBER:  TST 27
14244 ;          6809  !
14245 ;          6810  ! TEST NAME:    INITIAL ARRAY TEST
14246 ;          6811  !
14247 ;          6812  ! TEST DESCRIPTION:
14248 ;          6813  !
14249 ;          6814  !       DUE TO THE NATURE OF THE DEVICE
14250 ;          6815  !       THERE EXISTS KNOWN BAD ARRAY
14251 ;          6816  !       DATA LOCATIONS.
14252 ;          6817  !
14253 ;          6818  !       THEREFORE TO INITIALLY TEST THE ARRAYS'
14254 ;          6819  !       TIMING AND CONTROL LOGIC A BAD
14255 ;          6820  !       NIBBLE THRESHOLD OF 36 BAD NIBBLES
14256 ;          6821  !       OUT OF 100 NIBBLES TESTED WILL BE
14257 ;          6822  !       TOLERATED BEFORE DETERMINING CONTROL
14258 ;          6823  !       LOGIC TO BE IN ERROR.
14259 ;          6824  !
14260 ;          6825  !       THE ARRAYS' ARE INITIALLY TESTED BY:
14261 ;          6826  !
14262 ;          6827  !       1.  VIA DAT_DM MOD WRITE DATA PATTERNS
14263 ;          6828  !           OF 1'S AND 0'S TO 5 ARRAY
14264 ;          6829  !           WORDS.
14265 ;          6830  !
14266 ;          6831  !       2.  TEST EACH NIBBLE (4 BITS) FOR
14267 ;          6832  !           1'S AND 0'S AND COUNT EACH BAD
14268 ;          6833  !           NIBBLE ENCOUNTERED.
14269 ;          6834  !
14270 ;          6835  !       3.  IF ACCUMULATED BAD NIBBLES
14271 ;          6836  !           EXCEED 36 THEN REPORT AN ERROR.
14272 ;          6837  !
14273 ;          6838  !--
14274 ;          6839
14275 ;          6840  local
14276 ;          6841      TST_PAT,                          !TEST PATTERN
14277 ;          6842      BAD_NIB_CNT,                      !NUMBER OF BAD NIBBLES FOUND
14278 ;          6843      ERR_FLG;                          !ERROR FLAG
14279 ;          6844
14280 ;          6845  TST_PAT = ONES;
14281 ;          6846  BAD_NIB_CNT = ZEROES;
14282 ;          6847
14283 ;          6848  incr TWICE from 0 to 1 do             !REPEAT LOOP TWICE
14284 ;          6849      begin
14285 ;          6850      BGNSUB;
14286 ;          6851      CLR_MBUS;
14287 ;          6852      MLD1 = .TST_PAT;                  !LOAD TEST PATTERN INTO DIAG REGISTERS
14288 ;          6853      MLD2 = .TST_PAT;
14289 ;          6854      MLE2 = .TST_PAT;
```

```
14291 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
14292 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (77)
14293
14294 ;         6855      DAT_DM = ONE;                       !SET DATA DIAG MODE
14295 ;         6856      FIRST_BLK_XFER ();                  !SET UP A FIRST BLK XFERR
14296 ;         6857      MLCS1 = write;                      !DO A MBUS WRITE FUNCTION
14297 ;         6858
14298 ;         6859      incr CNT from 0 to 4 do             !CLOCK 5 WORDS INTO MEMORY
14299 ;         6860          begin
14300 ;         6861          DELAY (ONE_US);
14301 ;         6862          DAT_CLK = ONE;
14302 ;         6863          end;
14303 ;         6864
14304 ;         6865      CLR_MBUS;
14305 ;         6866      DAT_DM = ONE;                       !SET DATA DIAG MODE
14306 ;         6867      FIRST_BLK_XFER ();                  !SET UP A FIRST BLK XFERR
14307 ;         6868      MLCS1 = read;                       !DO A READ FUNCTION
14308 ;         6869      DELAY (ONE_US);
14309 ;         6870
14310 ;         6871      incr ARR_WRD from 0 to 4 do         !READ THE 5 WORD IN MEMORY
14311 ;         6872          begin
14312 ;         6873          DAT_CLK = ONE;                  !CLOCK OUT A WORD INTO THE DIAG REGS
14313 ;         6874          DELAY (ONE_US);
14314 ;         6875          RD_LNG_WRD;                     !READ THE DIAG REGISTERS
14315 ;         6876
14316 ;         6877          incr NIB_PTR from 0 to 9 do     !READ THE 10 NIBBLES IN THE WORD
14317 ;         6878              begin
14318 ;         6879              TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);  !COMPARE TST PAT TO NIBBLE UNDER TEST
14319 ;         6880
14320 ;         6881              if .ERR_FLG IS_SET then BAD_NIB_CNT = .BAD_NIB_CNT + 1;
14321 ;         6882
14322 ;         6883                                          !INCREMENT BAD_NIBBLE COUNT IFERR_FLG SET
14323 ;         6884              end;
14324 ;         6885
14325 ;         6886          end;
14326 ;         6887
14327 ;         6888      TST_PAT = not .TST_PAT;             !REPEAT WITH COMPLIMENT TST PAT
14328 ;         6889      ENDSUB;
14329 ;         6890      end;
14330 ;         6891
14331 ;         6892  if .BAD_NIB_CNT gtr 36                  !SEE IF 36 OUT OF THE 100 XFERRED WHERE BAD
14332 ;         6893  then
14333 ;         6894      begin                               !ERROR IF GTR 36
14334 ;         6895      ERRDF (77, ASYNC, DUMPER);
14335 ;         6896      PRINTB (FIV_FMT, WRD_22, PHR_4, WRD_12, WRD_45, FNC_14);
14336 ;         6897      DODU (.ML_LUN);
14337 ;         6898      DOCLN;
14338 ;         6899      end;
14339 ;         6900
14340 ;         6901  ENDTST;
14344
14345                                   .SBTTL  $T27
```

```
                                                                                                                    14-May-1981 13:48:54    TOPS
                                                                                                                    14-May-1981 13:05:08    PA:<
14347                                   ;ML4
14348                                   ;
14349
14353 050660  004167  133232     $T27:  JSR     R1,$SAVE5                    ;                                                          6801
14354 050664  024646                    CMP     -(SP),-(SP)
14355 050666  012701  177777             MOV     #-1,R1                       ; *,TST.PAT                                                6845
14356 050672  005046                    CLR     -(SP)                        ; BAD.NIB.CNT                                              6846
14357 050674  005005                    CLR     R5                           ; TWICE                                                    6848
14358 050676  104402              1$:   TRAP    2                            ;                                                          6849
14359 050700  152777  000040  142306    BISB    #40,@ML.REG+40               ;                                                          6850
14360 050706  016704  142670             MOV     ML.DUT,R4
14361 050712  042704  177770             BIC     #177770,R4
14362 050716  142777  000007  142270    BICB    #7,@ML.REG+40
14363 050724  150477  142264             BISB    R4,@ML.REG+40
14364 050730  010177  142410             MOV     R1,@ML.REG+170               ; TST.PAT,*                                                6852
14365 050734  010177  142414             MOV     R1,@ML.REG+200               ; TST.PAT,*                                                6853
14366 050740  010177  142370             MOV     R1,@ML.REG+160               ; TST.PAT,*                                                6854
14367 050744  152777  000010  142322    BISB    #10,@ML.REG+120              ;                                                          6855
14368 050752  004767  145062             JSR     PC,FIRST.BLK.XFER            ;                                                          6856
14369 050756  012777  000061  142170    MOV     #61,@ML.REG                  ;                                                          6857
14370 050764  005002                    CLR     R2                           ; CNT                                                      6859
14371 050766  012703  000001       2$:   MOV     #1,R3                        ; *,$$TMP2                                                 6861
14372 050772  001411              3$:   BEQ     6$
14373 050774  016704  131116             MOV     L$DLY,R4                     ; *,$$TMP1
14374 051000  001404                    BEQ     5$
14375 051002  005066  000004       4$:   CLR     4(SP)                        ; $$TMP
14376 051006  005304                    DEC     R4                           ; $$TMP1
14377 051010  001374                    BNE     4$
14378 051012  005303              5$:   DEC     R3                           ; $$TMP2
14379 051014  000766                    BR      3$
14380 051016  152777  000020  142250    BISB    #20,@ML.REG+120              ;                                                          6862
14381 051024  005202                    INC     R2                           ; CNT                                                      6859
14382 051026  020227  000004             CMP     R2,#4                        ; CNT,*
14383 051032  003755                    BLE     2$
14384 051034  152777  000040  142152    BISB    #40,@ML.REG+40               ;                                                          6863
14385 051042  016704  142534             MOV     ML.DUT,R4
14386 051046  042704  177770             BIC     #177770,R4
14387 051052  142777  000007  142134    BICB    #7,@ML.REG+40
14388 051060  150477  142130             BISB    R4,@ML.REG+40
14389 051064  152777  000010  142202    BISB    #10,@ML.REG+120              ;                                                          6866
14390 051072  004767  144742             JSR     PC,FIRST.BLK.XFER            ;                                                          6867
14391 051076  012777  000071  142050    MOV     #71,@ML.REG                  ;                                                          6868
14392 051104  012703  000001             MOV     #1,R3                        ; *,$$TMP2                                                 6869
14393 051110  001411              7$:   BEQ     10$
14394 051112  016704  131000             MOV     L$DLY,R4                     ; *,$$TMP1
14395 051116  001404                    BEQ     9$
14396 051120  005066  000004       8$:   CLR     4(SP)                        ; $$TMP
14397 051124  005304                    DEC     R4                           ; $$TMP1
14398 051126  001374                    BNE     8$
14399 051130  005303              9$:   DEC     R3                           ; $$TMP2
14400 051132  000766                    BR      7$
14401 051134  005002             10$:   CLR     R2                           ; ARR.WRD                                                  6871
```

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14403                                  ;ML4                                                    14-May-1981 13:48:54    TOPS
14404                                  ;                                                       14-May-1981 13:05:08    PA:<
14405
14406 051136  152777  000020  142130  11$:    BISB    #20,@ML.REG+120                ;                                    6873
14407 051144  012703  000001                   MOV     #1,R3                          ; *,$$TMP2                           6874
14408 051150  001411                   12$:    BEQ     15$
14409 051152  016704  130740                   MOV     L$DLY,R4                       ; *,$$TMP1
14410 051156  001404                           BEQ     14$
14411 051160  005066  000004           13$:    CLR     4(SP)                          ; $$TMP
14412 051164  005304                           DEC     R4                             ; $$TMP1
14413 051166  001374                           BNE     13$
14414 051170  005303                   14$:    DEC     R3                             ; $$TMP2
14415 051172  000766                           BR      12$
14416 051174  017767  142144  137750  15$:    MOV     @ML.REG+170,D1.TEMP
14417 051202  017767  142146  137744          MOV     @ML.REG+200,D2.TEMP
14418 051210  017767  142120  137740          MOV     @ML.REG+160,E2.TEMP
14419 051216  005004                           CLR     R4                             ; NIB.PTR                            6877
14420 051220  010446                   16$:    MOV     R4,-(SP)                       ; NIB.PTR,*                          6879
14421 051222  010146                           MOV     R1,-(SP)                       ; TST.PAT,*
14422 051224  012746  000010                   MOV     #10,-(SP)
14423 051230  060616                           ADD     SP,(SP)                        ; ERR.FLG,*
14424 051232  004767  144716                   JSR     PC,TST.LNG.WRD
14425 051236  026627  000010  000001          CMP     10(SP),#1                      ; ERR.FLG,*                          6881
14426 051244  001002                           BNE     17$
14427 051246  005266  000006                   INC     6(SP)                          ; BAD.NIB.CNT
14428 051252  062706  000006           17$:    ADD     #6,SP                          ;                                    6878
14429 051256  005204                           INC     R4                             ; NIB.PTR                            6877
14430 051260  020427  000011                   CMP     R4,#11                         ; NIB.PTR,*
14431 051264  003755                           BLE     16$
14432 051266  005202                           INC     R2                             ; ARR.WRD                            6871
14433 051270  020227  000004                   CMP     R2,#4                          ; ARR.WRD,*
14434 051274  003720                           BLE     11$
14435 051276  005101                           COM     R1                             ; TST.PAT                            6888
14436 051300  104467                           TRAP    67
14437 051302  006000                           ROR     R0
14438 051304  103002                           BHIS    19$
14439 051306  000167  177364           18$:    JMP     1$
14440 051312  005205                   19$:    INC     R5                             ; TWICE                              6848
14441 051314  020527  000001                   CMP     R5,#1                          ; TWICE,*
14442 051320  003772                           BLE     18$
14443 051322  021627  000044                   CMP     (SP),#44                       ; BAD.NIB.CNT,*                      6892
14444 051326  003432                           BLE     20$
14445 051330  104455                           TRAP    55                             ;                                    6895
14446 051332  000115                           .WORD   115
14447 051334  010464                           .WORD   ASYNC
14448 051336  024060                           .WORD   DUMPER
14449 051340  012746  010122                   MOV     #FNC.14,-(SP)                  ;                                    6896
14450 051344  012746  006772                   MOV     #WRD.45,-(SP)
14451 051350  012746  006426                   MOV     #WRD.12,-(SP)
14452 051354  012746  007454                   MOV     #PHR.4,-(SP)
14453 051360  012746  006530                   MOV     #WRD.22,-(SP)
14454 051364  012746  006062                   MOV     #FIV.FMT,-(SP)
14455 051370  012746  000006                   MOV     #6,-(SP)
14456 051374  010600                           MOV     SP,R0                          ; SP,*
14457 051376  104414                           TRAP    14
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14459                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
14460                                   ;                                                       14-May-1981 13:05:08    PA:<
14461
14462 051400  016700  142174                    MOV     ML.LUN,R0                       ;                               6897
14463 051404  104451                            TRAP    51
14464 051406  104444                            TRAP    44
14465 051410  062706  000016                    ADD     #16,SP                          ;                               6894
14466 051414  062706  000006              20$:  ADD     #6,SP                           ;                               6801
14467 051420  000207                            RTS     PC
14468
14469                                   ; Routine Size:  177 words
14470                                   ; Maximum stack depth per invocation:  16 words
14475
14476
14480
14481                                           .SBTTL  T27
14485 051422                            T27::
14486 051422  004767  177232            1$:     JSR     PC,$T27                         ;                               6899
14487 051426  104466                            TRAP    66
14488 051430  006000                            ROR     R0
14489 051432  103773                            BLO     1$
14490 051434  000207                            RTS     PC
14491
14492                                   ; Routine Size:  6 words
14493                                   ; Maximum stack depth per invocation:  0 words
14498
14499
14500 ;          6902  !<BLF/PAGE>
```

```
14502 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
14503 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (78)
14504
14505 ;          6903  !
14506 ;          6904  BGNTST;
14507 ;          6905
14508 ;          6906  !++
14509 ;          6907  ! TEST NUMBER:  TST 28
14510 ;          6908  !
14511 ;          6909  ! TEST NAME:    PROM SELECTION TEST
14512 ;          6910  !
14513 ;          6911  ! TEST DESCRIPTION:
14514 ;          6912  !       DUE TO THE NATURE OF THE DEVICE
14515 ;          6913  !       AND OF THE ARRAY MODULES' UV
14516 ;          6914  !       PROMS, ONLY PROM READS ARE
14517 ;          6915  !       ALLOWED DURING DIAG TESTING.
14518 ;          6916  !
14519 ;          6917  !       THEREFORE THE ARRAY MODULE UV PROMS
14520 ;          6918  !       ARE TESTED FOR UNIQUE SELECTION BY:
14521 ;          6919  !
14522 ;          6920  !       1.  AT EACH PRESENT ARRAY MODULE WRITE 127 ARRAY WORDS WITH 1'S/0'S PATTERN.
14523 ;          6921  !
14524 ;          6922  !       2.  READ THE UV PROMS AT THEIR RESPECTIVE ARRAY WORD LOCATION AND SEE IF
14525 ;          6923  !           THE PROMS MASK BAD NIBBLE LOCATIONS (ENCOUNTERED BAD NIBBLES
14526 ;          6924  !           INDICATES INCORRECT MASKING).  COUNT EACH BAD NIBBLE ENCOUNTERED AT AN
14527 ;          6925  !           ARRAY MODULE.
14528 ;          6926  !
14529 ;          6927  !       3.  ALLOW A THRESHOLD OF 5 BAD NIBBLES AT ANY ARRAY MODULE.
14530 ;          6928  !
14531 ;          6929  !       4.  REPORT PROM SEL ERRORS AT RESPECTIVE ARRAY MODULE IF THE
14532 ;          6930  !           THRESHOLD IS EXCEEDED.
14533 ;          6931  !
14534 ;          6932  ! IMPLICIT INPUTS:
14535 ;          6933  !       PD_TEMP:
14536 ;          6934  !       A BIT VECTOR OF 16 BITS WHERE
14537 ;          6935  !       THE READ PROM DATA IS STORED
14538 ;          6936  !       AND ACCESSED FROM.
14539 ;          6937  !
14540 ;          6938  !       IO_BUF
14541 ;          6939  !       A VECTOR OF 256 WORDS WHERE
14542 ;          6940  !       DATA FOR MBUS READS AND WRITE
14543 ;          6941  !       FUNCTION ARE FOUND.
14544 ;          6942  !
14545 ;          6943  !--
14546 ;          6944
14547 ;          6945  local
14548 ;          6946      DODU_FLG,                                   !DROP UNIT FLG
14549 ;          6947      ERR_FLG,                                    !ERROR FLG
14550 ;          6948      TST_PAT,                                    !TEST PATTERN
14551 ;          6949      ERR_CNT;                                    !ERROR COUNT
14552 ;          6950
14553 ;          6951  DODU_FLG = ZERO;
14554 ;          6952  TST_PAT = ONES;
14555 ;          6953
14556 ;          6954  incr ARR_SEL from 0 to .LST_ARR by .ARR_INC do  !TEST ALL PRESENT ARRAYS
```

```
14558 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
14559 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (78)
14560
14561 ;          6955        begin
14562 ;          6956        ERR_CNT = ZERO;
14563 ;          6957        BGNSUB;
14564 ;          6958
14565 ;          6959        incr TWICE from 0 to 1 do                   !REPEAT LOOP TWICE
14566 ;          6960            begin
14567 ;          6961            CLR_MBUS;
14568 ;          6962            MLD1 = .TST_PAT;                        !LOAD DATA DIAG REGISTERS WITH TST_PAT
14569 ;          6963            MLD2 = .TST_PAT;
14570 ;          6964            MLE2 = .TST_PAT;
14571 ;          6965            DAT_DM = ONE;                           !SET DATA DIAG MODE
14572 ;          6966            MLWC = not 255;                         !LOAD WORD COUNT
14573 ;          6967            MLBA = IO_BUF;                          !LOAD UBUS ADRS
14574 ;          6968            MLDA = .ARR_SEL;                        !LOAD SECTOR
14575 ;          6969            MLCS1 = write;                          !DO A WRITE FUNCTION
14576 ;          6970
14577 ;          6971            incr CNT from 0 to 127 do               !CLOCK IN 127 WORDS
14578 ;          6972                begin
14579 ;          6973                DELAY (ONE_US);
14580 ;          6974                DAT_CLK = ONE;
14581 ;          6975                end;
14582 ;          6976
14583 ;          6977            CLR_MBUS;
14584 ;          6978            DAT_DM = ONE;                           !SET DATA DIAG MODE
14585 ;          6979            MLWC = not 255;                         !LOAD WORD COUNT
14586 ;          6980            MLBA = IO_BUF;                          !LOAD UBUS ADRS
14587 ;          6981            MLDA = .ARR_SEL;                        !LOAD SECTOR
14588 ;          6982            MLCS1 = read;                           !DO A READ FUNCTION
14589 ;          6983            DELAY (ONE_US);
14590 ;          6984
14591 ;          6985            incr WD_CNT from 0 to 127 do            !READ THE 10 WORDS
14592 ;          6986                begin
14593 ;          6987                PD_TEMP = .MLPD;                    !GET PROM DATA FOR THIS WORD
14594 ;          6988                DAT_CLK = ONE;                      !CLOCK THIS WORD INTO DIAG REG
14595 ;          6989                DELAY (ONE_US);
14596 ;          6990                RD_LNG_WRD;                         !READ DIAG REG FOR THIS WORD
14597 ;          6991
14598 ;          6992                incr NIB_PTR from 0 to 9 do         !LOOK AT ALL 10 NIBBLE
14599 ;          6993
14600 ;          6994                    if .PD_TEMP [.NIB_PTR] IS_NOT_SET       !FIND GOOD NIBBLES
14601 ;          6995                    then
14602 ;          6996                        begin
14603 ;          6997                        TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);  !COMPARE NIBBLE TO TST_PAT
14604 ;          6998
14605 ;          6999                        if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + 1;
14606 ;          7000
14607 ;          7001                                                    !INCREMENT ERROR COUNT IF ERROR FLG IS SET
14608 ;          7002                        end;
14609 ;          7003
14610 ;          7004                end;
14611 ;          7005
14612 ;          7006        TST_PAT = not .TST_PAT;                     !REPEAT WITH COMPLIMENT DATA
```

```
14614 :ML4                                                          14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
14615 :                                                             14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (78)
14616
14617 :          7007          end;
14618 :          7008
14619 :          7009      if .ERR_CNT gtr 5                       !ALLOW 5 ERROR BEFORE ERRORING
14620 :          7010      then
14621 :          7011          begin                               !ERROR IF GTR 5
14622 :          7012          ERRDF (78, ARR_DAT, DUMPER);
14623 :          7013          PRINTB (THR_FMT, WRD_35, WRD_37, WRD_10);
14624 :          7014          PRINTB (FMT_9, .ARR_SEL);
14625 :          7015          DODU_FLG = ONE;
14626 :          7016          end;
14627 :          7017
14628 :          7018      ENDSUB;
14629 :          7019
14630 :          7020      if .DODU_FLG IS_SET                     !DROP THIS UNIT IF DODU_FLG IS SET
14631 :          7021      then
14632 :          7022          begin
14633 :          7023          DODU (.ML_LUN);
14634 :          7024          DOCLN;
14635 :          7025          end;
14636 :          7026
14637 :          7027      end;
14638 :          7028
14639 :          7029  ENDTST;
14643
14644                                  .SBTTL  $T28
14648 051436  004167  132454          $T28:   JSR     R1,$SAVE5                   ;                          6901
14649 051442  162706  000016                  SUB     #16,SP
14650 051446  005066  000010                  CLR     10(SP)                      ; DODU.FLG                 6951
14651 051452  012702  177777                  MOV     #-1,R2                      ; *,TST.PAT                6952
14652 051456  016766  140114  000006          MOV     LST.ARR,6(SP)               ;                          6954
14653 051464  016766  140072  000004          MOV     ARR.INC,4(SP)
14654 051472  005001                          CLR     R1                          ; ARR.SEL
14655 051474  000167  000666                  JMP     25$
14656 051500  005066  000002          1$:     CLR     2(SP)                       ; ERR.CNT                  6956
14657 051504  104402                  2$:     TRAP    2
14658 051506  005016                          CLR     (SP)                        ; TWICE                    6959
14659 051510  152777  000040  141476  3$:     BISB    #40,@ML.REG+40              ;                          6960
14660 051516  016705  142060                  MOV     ML.DUT,R5
14661 051522  042705  177770                  BIC     #177770,R5
14662 051526  142777  000007  141460          BICB    #7,@ML.REG+40
14663 051534  150577  141454                  BISB    R5,@ML.REG+40
14664 051540  010277  141600                  MOV     R2,@ML.REG+170              ; TST.PAT,*                6962
14665 051544  010277  141604                  MOV     R2,@ML.REG+200              ; TST.PAT,*                6963
14666 051550  010277  141560                  MOV     R2,@ML.REG+160              ; TST.PAT,*                6964
14667 051554  152777  000010  141512          BISB    #10,@ML.REG+120             ;                          6965
14668 051562  012777  177400  141374          MOV     #-400,@ML.REG+10            ;                          6966
```

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14670                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
14671                                   ;                                                       14-May-1981 13:05:08    PA:<
14672
14673 051570  012777  011600  141376          MOV     #IO.BUF,@ML.REG+20      ;                                       6967
14674 051576  010177  141402                  MOV     R1,@ML.REG+30           ; ARR.SEL,*                             6968
14675 051602  012777  000061  141344          MOV     #61,@ML.REG             ;                                       6969
14676 051610  005003                          CLR     R3                      ; CNT                                   6971
14677 051612  012704  000001          4$:     MOV     #1,R4                   ; *,$$TMP2                              6973
14678 051616  001411                  5$:     BEQ     8$
14679 051620  016705  130272                  MOV     L$DLY,R5                ; *,$$TMP1
14680 051624  001404                          BEQ     7$
14681 051626  005066  000014          6$:     CLR     14(SP)                  ; $$TMP
14682 051632  005305                          DEC     R5                      ; $$TMP1
14683 051634  001374                          BNE     6$
14684 051636  005304                  7$:     DEC     R4                      ; $$TMP2
14685 051640  000766                          BR      5$
14686 051642  152777  000020  141424  8$:     BISB    #20,@ML.REG+120         ;                                       6974
14687 051650  005203                          INC     R3                      ; CNT                                   6971
14688 051652  020327  000177                  CMP     R3,#177                 ; CNT,*
14689 051656  003755                          BLE     4$
14690 051660  152777  000040  141326          BISB    #40,@ML.REG+40          ;                                       6975
14691 051666  016705  141710                  MOV     ML.DUT,R5
14692 051672  042705  177770                  BIC     #177770,R5
14693 051676  142777  000007  141310          BICB    #7,@ML.REG+40
14694 051704  150577  141304                  BISB    R5,@ML.REG+40
14695 051710  152777  000010  141356          BISB    #10,@ML.REG+120         ;                                       6978
14696 051716  012777  177400  141240          MOV     #-400,@ML.REG+10        ;                                       6979
14697 051724  012777  011600  141242          MOV     #IO.BUF,@ML.REG+20      ;                                       6980
14698 051732  010177  141246                  MOV     R1,@ML.REG+30           ; ARR.SEL,*                             6981
14699 051736  012777  000071  141210          MOV     #71,@ML.REG             ;                                       6982
14700 051744  012704  000001                  MOV     #1,R4                   ; *,$$TMP2                              6983
14701 051750  001411                  9$:     BEQ     12$
14702 051752  016705  130140                  MOV     L$DLY,R5                ; *,$$TMP1
14703 051756  001404                          BEQ     11$
14704 051760  005066  000014          10$:    CLR     14(SP)                  ; $$TMP
14705 051764  005305                          DEC     R5                      ; $$TMP1
14706 051766  001374                          BNE     10$
14707 051770  005304                  11$:    DEC     R4                      ; $$TMP2
14708 051772  000766                          BR      9$
14709 051774  005003                  12$:    CLR     R3                      ; WD.CNT                                6985
14710 051776  017767  141402  141114  13$:    MOV     @ML.REG+230,PD.TEMP     ;                                       6987
14711 052004  152777  000020  141262          BISB    #20,@ML.REG+120         ;                                       6988
14712 052012  012704  000001                  MOV     #1,R4                   ; *,$$TMP2                              6989
14713 052016  001411                  14$:    BEQ     17$
14714 052020  016705  130072                  MOV     L$DLY,R5                ; *,$$TMP1
14715 052024  001404                          BEQ     16$
14716 052026  005066  000014          15$:    CLR     14(SP)                  ; $$TMP
14717 052032  005305                          DEC     R5                      ; $$TMP1
14718 052034  001374                          BNE     15$
14719 052036  005304                  16$:    DEC     R4                      ; $$TMP2
14720 052040  000766                          BR      14$
14721 052042  017767  141276  137102  17$:    MOV     @ML.REG+170,D1.TEMP
14722 052050  017767  141300  137076          MOV     @ML.REG+200,D2.TEMP
14723 052056  017767  141252  137072          MOV     @ML.REG+160,E2.TEMP
14724 052064  005004                          CLR     R4                      ; NIB.PTR                               6992
```

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14726                          ;ML4                                                    14-May-1981 13:48:54    TOPS
14727                          ;                                                       14-May-1981 13:05:08    PA:<
14728
14729 052066  010405           18$:    MOV     R4,R5                   ; NIB.PTR,*                             6994
14730 052070  006205                   ASR     R5
14731 052072  006205                   ASR     R5
14732 052074  006205                   ASR     R5
14733 052076  062705  013120           ADD     #PD.TEMP,R5
14734 052102  010546                   MOV     R5,-(SP)
14735 052104  010446                   MOV     R4,-(SP)                ; NIB.PTR,*
14736 052106  042716  177770           BIC     #177770,(SP)
14737 052112  012746  000001           MOV     #1,-(SP)
14738 052116  005046                   CLR     -(SP)
14739 052120  004767  131014           JSR     PC,BL$GT2
14740 052124  062706  000010           ADD     #10,SP
14741 052130  005700                   TST     R0
14742 052132  001017                   BNE     20$
14743 052134  010446                   MOV     R4,-(SP)                ; NIB.PTR,*                             6997
14744 052136  010246                   MOV     R2,-(SP)                ; TST.PAT,*
14745 052140  012746  000020           MOV     #20,-(SP)
14746 052144  060616                   ADD     SP,(SP)                 ; ERR.FLG,*
14747 052146  004767  144002           JSR     PC,TST.LNG.WRD
14748 052152  026627  000020  000001   CMP     20(SP),#1               ; ERR.FLG,*                             6999
14749 052160  001002                   BNE     19$
14750 052162  005266  000010           INC     10(SP)                  ; ERR.CNT
14751 052166  062706  000006   19$:    ADD     #6,SP                   ;                                       6996
14752 052172  005204           20$:    INC     R4                      ; NIB.PTR                               6992
14753 052174  020427  000011           CMP     R4,#11                  ; NIB.PTR,*
14754 052200  003732                   BLE     18$
14755 052202  005203                   INC     R3                      ; WD.CNT                                6985
14756 052204  020327  000177           CMP     R3,#177                 ; WD.CNT,*
14757 052210  003672                   BLE     13$
14758 052212  005102                   COM     R2                      ; TST.PAT                               7006
14759 052214  005216                   INC     (SP)                    ; TWICE                                 6959
14760 052216  021627  000001           CMP     (SP),#1                 ; TWICE,*
14761 052222  003002                   BGT     21$
14762 052224  000167  177260           JMP     3$
14763 052230  026627  000002  000005   21$:    CMP     2(SP),#5                ; ERR.CNT,*                     7009
14764 052236  003434                   BLE     22$
14765 052240  104455                   TRAP    55                      ;                                       7012
14766 052242  000116                   .WORD   116
14767 052244  010570                   .WORD   ARR.DAT
14768 052246  024060                   .WORD   DUMPER
14769 052250  012746  006406           MOV     #WRD.10,-(SP)           ;                                       7013
14770 052254  012746  006700           MOV     #WRD.37,-(SP)
14771 052260  012746  006666           MOV     #WRD.35,-(SP)
14772 052264  012746  006034           MOV     #THR.FMT,-(SP)
14773 052270  012746  000004           MOV     #4,-(SP)
14774 052274  010600                   MOV     SP,R0                   ; SP,*
14775 052276  104414                   TRAP    14
14776 052300  010116                   MOV     R1,(SP)                 ; ARR.SEL,*                             7014
14777 052302  012746  004644           MOV     #FMT.9,-(SP)
14778 052306  012746  000002           MOV     #2,-(SP)
14779 052312  010600                   MOV     SP,R0                   ; SP,*
14780 052314  104414                   TRAP    14
```

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                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                                                                                                        7015
052316  012766  000001  000026          MOV     #1,26(SP)               ; *,DODU.FLG            ;                       7011
052324  062706  000016                  ADD     #16,SP                  ;                       ;                       7016
052330  104467                  22$:     TRAP    67                      ;                       ;
052332  006000                          ROR     R0
052334  103002                          BHIS    23$
052336  000167  177142                  JMP     2$
052342  026627  000010  000001  23$:     CMP     10(SP),#1               ; DODU.FLG,*                                    7020
052350  001004                          BNE     24$
052352  016700  141222                  MOV     ML.LUN,R0               ;                                               7023
052356  104451                          TRAP    51
052360  104444                          TRAP    44
052362  066601  000004          24$:     ADD     4(SP),R1                ; *,ARR.SEL                                     6954
052366  020166  000006          25$:     CMP     R1,6(SP)                ; ARR.SEL,*
052372  003002                          BGT     26$
052374  000167  177100                  JMP     1$
052400  062706  000016          26$:     ADD     #16,SP                  ;                                               6901
052404  000207                          RTS     PC
                                        ; Routine Size:  244 words
                                        ; Maximum stack depth per invocation:  20 words
                                        .SBTTL  T28
052406                          T28::
052406  004767  177024          1$:     JSR     PC,$T28                 ;                                               7027
052412  104466                          TRAP    66
052414  006000                          ROR     R0
052416  103773                          BLO     1$
052420  000207                          RTS     PC
                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
                                        ;       7030  !<BLF/PAGE>
```

```
14836 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
14837 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (79)
14838
14839 ;          7031  !
14840 ;          7032  BGNTST;
14841 ;          7033
14842 ;          7034  !++
14843 ;          7035  ! TEST NUMBER:  TST 29
14844 ;          7036  !
14845 ;          7037  ! TEST NAME:    READ WRITE ARRAYS WITH PROM DATA
14846 ;          7038  !
14847 ;          7039  ! TEST DESCRIPTION:
14848 ;          7040  !       COMBINE THE READING OF ARRAY
14849 ;          7041  !       MODULE DATA WITH ARRAY MODULE UV PROM DATA AND
14850 ;          7042  !       FIND A GOOD BLOCK WHERE FURTHER
14851 ;          7043  !       TESTING WILL BE PERFORMED BY:
14852 ;          7044  !
14853 ;          7045  !       1.  STARTING AT BLOCK 0 WRITE THE BLOCK WITH SELECTED DATA PATTERNS
14854 ;          7046  !           AND READ THE BLOCK AVOIDING ANY BAD NIBBLES POINTED TO BY THE
14855 ;          7047  !           PROM DATA.
14856 ;          7048  !
14857 ;          7049  !           SET ERROR FLAG IF ANY BAD NIBBLES ARE ENCOUNTERED IN BLOCK.
14858 ;          7050  !
14859 ;          7051  !       2.  REPEAT WRITING/READING THIS BLOCK UNTIL ALL PATTERNS ARE TESTED
14860 ;          7052  !           OR THE ERROR FLAG IS SET.
14861 ;          7053  !
14862 ;          7054  !       3.  IF ALL PATTERN HAVE BEEN TESTED AND THE ERROR FLAG IS NOT SET
14863 ;          7055  !           THEN SAVE THIS BLOCK ADDRESS AS THE GOOD BLOCK ADRS AND EXIT TEST.
14864 ;          7056  !
14865 ;          7057  !       4.  ELSE IF THE ERROR FLG HAS SET THEN REPEAT TEST AT THE NEXT ROW.
14866 ;          7058  !           REPEAT UNTIL A GOOD BLOCK IS FOUND OR LAST ROW IS REACHED.
14867 ;          7059  !
14868 ;          7060  !       5.  IF NO GOOD BLOCK IS FOUND BY LAST ROW THEN REPORT ERROR AND
14869 ;          7061  !           EXIT TEST.
14870 ;          7062  !
14871 ;          7063  ! IMPLICIT INPUTS:
14872 ;          7064  !       RAS_INC
14873 ;          7065  !       LOADED DURING THE INITIALIZATION CODE AND CONTAINS THE ROW ADDRESS
14874 ;          7066  !       INCREMENT VALUE FOR THIS DRIVE.
14875 ;          7067  !
14876 ;          7068  !
14877 ;          7069  !       PD_TEMP:
14878 ;          7070  !       A BITVECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND
14879 ;          7071  !       ACCESSED FROM.
14880 ;          7072  !
14881 ;          7073  !       IO_BUF:
14882 ;          7074  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTION
14883 ;          7075  !       ARE FOUND.
14884 ;          7076  !
14885 ;          7077  !
14886 ;          7078  !--
14887 ;          7079
14888 ;          7080  local
14889 ;          7081      WRD_CNT,                          !WORD COUNT
14890 ;          7082      NIB_PTR,                          !NIBBLE POINTER
14891 ;ML4                                                   14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
14892 ;                                                      14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (79)
```

```
14893
14894 ;          7083      PASS_CNT,                              !PASS COUNT
14895 ;          7084      NIB_PAT,                               !NIBBLE PATTERN
14896 ;          7085      DONE_FLG,                              !DONE FLAG
14897 ;          7086      ERR_FLG,                               !ERROR FLAG
14898 ;          7087      SECTOR_NO;                             !SECTOR NUMBER
14899 ;          7088
14900 ;          7089  BGNSUB;
14901 ;          7090  PASS_CNT = -1;
14902 ;          7091  SECTOR_NO = ZEROES;
14903 ;          7092  DONE_FLG = ZERO;
14904 ;          7093
14905 ;          7094  do                                         !THIS LOOP DETERMINES WHEN TO STOP
14906 ;          7095      begin
14907 ;          7096
14908 ;          7097      do                                     !THIS LOOP RUNS THE PATTERNS
14909 ;          7098          begin
14910 ;          7099          PASS_CNT = .PASS_CNT + 1;          !INCREMENT THE PASS COUNT
14911 ;          7100          CLR_MBUS;
14912 ;          7101          DAT_DM = ONE;                      !SET DATA DIAG MODE
14913 ;          7102          MLDA = .SECTOR_NO;                 !LOAD SECTOR NUMBER IN DSA
14914 ;          7103          MLWC = not 255;                    !LOAD WORD COUNT
14915 ;          7104          MLBA = IO_BUF;                     !LOAD UBUS ADRS
14916 ;          7105
14917 ;          7106          case .PASS_CNT from 0 to 3 of      !SELECT A NIBBLE PATTERN
14918 ;          7107              set
14919 ;          7108
14920 ;          7109              [0] :
14921 ;          7110                  NIB_PAT = %o'000000';      !ZEROES
14922 ;          7111
14923 ;          7112              [1] :
14924 ;          7113                  NIB_PAT = %o'17';          !ONES
14925 ;          7114
14926 ;          7115              [2] :
14927 ;          7116                  NIB_PAT = %o'12';          !ALTERNATING ONE'S, ZEROES
14928 ;          7117
14929 ;          7118              [3] :
14930 ;          7119                  NIB_PAT = %o'15'           !COMPLIMENT ONE'S, ZEROES
14931 ;          7120              tes;
14932 ;          7121
14933 ;          7122          incr LD_CNT from 0 to 9 do         !LOAD NIBBLE PATTERN INTO NIBBLE SAVE
14934 ;          7123              LD_LNG_WRD (.LD_CNT, .NIB_PAT);
14935 ;          7124
14936 ;          7125          WRT_LNG_WRD;                       !LOAD THE DATA DIAG REGISTERS WITH NIBBLE SAVE
14937 ;          7126          MLCS1 = write;                     !DO A WRITE FUNCTION
14938 ;          7127
14939 ;          7128          incr WRT_CNT from 0 to 127 do      !WRITE PATTERN INTO THIS BLOCK
14940 ;          7129              begin
14941 ;          7130              DELAY (ONE_US);
14942 ;          7131              DAT_CLK = ONE;
14943 ;          7132              end;
14944 ;          7133
14945 ;          7134          CLR_MBUS;
14946 ;ML4                                                        14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
14947 ;                                                           14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (79)
14948
14949 ;          7135          DAT_DM = ONE;                      !SET DATA DIAG MODE
```

```
14950 ;          7136          MLDA = .SECTOR_NO;                          !LOAD SECTOR NUMBER
14951 ;          7137          MLWC = not 255;                             !LOAD WORD COUNT
14952 ;          7138          MLBA = IO_BUF;                              !LOAD UBUS ADRS
14953 ;          7139          MLCS1 = read;                               !DO A READ FUNCTION
14954 ;          7140          DELAY (ONE_US);
14955 ;          7141          WRD_CNT = -1;                               !RESET THE WORD COUNT
14956 ;          7142
14957 ;          7143          do
14958 ;          7144              begin                                   !TEST ONE BLOCK FOR NIBBLE PATTERN
14959 ;          7145              WRD_CNT = .WRD_CNT + 1;
14960 ;          7146              PD_TEMP = .MLPD;                        !GET PROM DATA
14961 ;          7147              DAT_CLK = ONE;                          !CLOCK DATA WORD INTO DIAG REG
14962 ;          7148              DELAY (ONE_US);                         !
14963 ;          7149              RD_LNG_WRD;                             !READ DIAG REGISTERS
14964 ;          7150              NIB_PTR = -1;                           !RESET THE NIBBLE POINTER
14965 ;          7151
14966 ;          7152              do
14967 ;          7153                  begin                               !SEARCH FOR GOOD NIBBLES
14968 ;          7154                  NIB_PTR = .NIB_PTR + 1;             !INCREMENT NIBBLE POINTER
14969 ;          7155
14970 ;          7156                  if .PD_TEMP [.NIB_PTR] IS_NOT_SET       !TEST THIS NIB IF PROM FLAG NOT SET
14971 ;          7157                  then
14972 ;          7158                      TST_LNG_WRD (.NIB_PTR, .NIB_PAT, ERR_FLG);
14973 ;          7159
14974 ;          7160                  end
14975 ;          7161              until (.ERR_FLG) or (.NIB_PTR eql 9);
14976 ;          7162
14977 ;          7163              end
14978 ;          7164          until (.ERR_FLG) or (.WRD_CNT eql 127);
14979 ;          7165
14980 ;          7166          end
14981 ;          7167      until (.PASS_CNT eql 3) or (.ERR_FLG IS_SET );      !REPEAT UNTIL ALL PAT TESTED OR ERROR FLG GETS SET
14982 ;          7168
14983 ;          7169      if (.PASS_CNT eql 3) and (.ERR_FLG IS_NOT_SET )     !WAS THIS A GOOD BLOCK?
14984 ;          7170      then
14985 ;          7171          begin                                           !YES
14986 ;          7172          DONE_FLG = ONE;                                 !SET DONE FLAG
14987 ;          7173          GOOD_BLK = .SECTOR_NO;                          !GOOD BLOCK GETS THIS SECTOR NO
14988 ;          7174          end
14989 ;          7175      else
14990 ;          7176          begin                                           !NO
14991 ;          7177          SECTOR_NO = .SECTOR_NO + .RAS_INC;              !INCREMENT ROW NO
14992 ;          7178          PASS_CNT = -1;                                  !RESET PASS COUNT
14993 ;          7179          end;
14994 ;          7180
14995 ;          7181      end
14996 ;          7182  until (.DONE_FLG IS_SET ) or (.SECTOR_NO eql .LST_ARR + .ARR_INC);
14997 ;          7183
14998 ;          7184                                                          !REPEAT UNTIL GOOD BLK FOUND OR AT LST ROW
14999 ;          7185  ENDSUB;
15000 ;          7186
15001 ;ML4                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
15002 ;                                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (79)
15003
15004 ;          7187  if .SECTOR_NO eql .LST_ARR + .ARR_INC                 !SEE IF WE'RE AT THE LAST BLOCK
15005 ;          7188  then
15006 ;          7189      begin                                             !A GOOD BLK NOT FOUND BEFORE LAST BLK
```

```
 15007 ;          7190      ERRDF (79, INTER, DUMPER);                    !ERROR AND DROP UNIT
 15008 ;          7191      PRINTB (THR_FMT, WRD_14, PHR_10, FNC_15);
 15009 ;          7192      DODU (.ML_LUN);
 15010 ;          7193      DOCLN;
 15011 ;          7194      end;
 15012 ;          7195
 15013 ;          7196  ENDTST;
 15017
 15018                                        .SBTTL  $T29
 15022 052422  004167  131470          $T29: JSR     R1,$SAVE5                 ;                                    7029
 15023 052426  162706  000014                SUB     #14,SP
 15024 052432  104402                  1$:   TRAP    2                         ;                                    7087
 15025 052434  012766  177777  000002        MOV     #-1,2(SP)                 ; *,PASS.CNT                         7090
 15026 052442  005002                        CLR     R2                        ; SECTOR.NO                          7091
 15027 052444  005066  000004                CLR     4(SP)                     ; DONE.FLG                           7092
 15028 052450  005266  000002          2$:   INC     2(SP)                     ; PASS.CNT                           7099
 15029 052454  152777  000040  140532        BISB    #40,@ML.REG+40
 15030 052462  016705  141114                MOV     ML.DUT,R5
 15031 052466  042705  177770                BIC     #177770,R5
 15032 052472  142777  000007  140514        BICB    #7,@ML.REG+40
 15033 052500  150577  140510                BISB    R5,@ML.REG+40
 15034 052504  152777  000010  140562        BISB    #10,@ML.REG+120           ;                                    7101
 15035 052512  010277  140466                MOV     R2,@ML.REG+30             ; SECTOR.NO,*                        7102
 15036 052516  012777  177400  140440        MOV     #-400,@ML.REG+10          ;                                    7103
 15037 052524  012777  011600  140442        MOV     #IO.BUF,@ML.REG+20        ;                                    7104
 15038 052532  016605  000002                MOV     2(SP),R5                  ; PASS.CNT,*                         7106
 15039 052536  006305                        ASL     R5
 15040 052540  066507  052544                ADD     3$(R5),PC
 15041 052544  000010                  3$:   .WORD   4$-3$
 15042 052546  000014                        .WORD   5$-3$
 15043 052550  000022                        .WORD   6$-3$
 15044 052552  000030                        .WORD   7$-3$
 15045 052554  005001                  4$:   CLR     R1                        ; NIB.PAT                            7110
 15046 052556  000410                        BR      8$                        ;                                    7106
 15047 052560  012701  000017          5$:   MOV     #17,R1                    ; *,NIB.PAT                          7113
 15048 052564  000405                        BR      8$                        ;                                    7106
 15049 052566  012701  000012          6$:   MOV     #12,R1                    ; *,NIB.PAT                          7116
 15050 052572  000402                        BR      8$                        ;                                    7106
 15051 052574  012701  000015          7$:   MOV     #15,R1                    ; *,NIB.PAT                          7119
 15052 052600  005005                  8$:   CLR     R5                        ; LD.CNT                             7122
 15053 052602  010546                  9$:   MOV     R5,-(SP)                  ; LD.CNT,*                           7123
 15054 052604  010146                        MOV     R1,-(SP)                  ; NIB.PAT,*
 15055 052606  004767  144320                JSR     PC,LD.LNG.WRD
 15056                                  ;ML4                                                14-May-1981 13:48:54    TOPS
 15057                                  ;                                                   14-May-1981 13:05:08    PA:<
 15058
 15059 052612  022626                        CMP     (SP)+,(SP)+
 15060 052614  005205                        INC     R5                        ; LD.CNT                             7122
 15061 052616  020527  000011                CMP     R5,#11                    ; LD.CNT,*
 15062 052622  003767                        BLE     9$
 15063 052624  016777  136322  140512        MOV     D1.TEMP,@ML.REG+170       ;                                    7123
 15064 052632  016777  136316  140514        MOV     D2.TEMP,@ML.REG+200
 15065 052640  016777  136312  140466        MOV     E2.TEMP,@ML.REG+160
 15066 052646  012777  000061  140300        MOV     #61,@ML.REG               ;                                    7126
 15067 052654  005003                        CLR     R3                        ; WRT.CNT                            7128
 15068 052656  012704  000001          10$:  MOV     #1,R4                     ; *,$$TMP2                           7130
 15069 052662  001411                  11$:  BEQ     14$
```

```
15070 052664 016705 127226           MOV   L$DLY,R5                ; *,$$TMP1
15071 052670 001404                  BEQ   13$
15072 052672 005066 000012     12$:  CLR   12(SP)                  ; $$TMP
15073 052676 005305                  DEC   R5                      ; $$TMP1
15074 052700 001374                  BNE   12$
15075 052702 005304            13$:  DEC   R4                      ; $$TMP2
15076 052704 000766                  BR    11$
15077 052706 152777 000020 140360 14$:  BISB  #20,@ML.REG+120       ;                                    7131
15078 052714 005203                  INC   R3                      ; WRT.CNT                            7128
15079 052716 020327 000177           CMP   R3,#177                 ; WRT.CNT,*
15080 052722 003755                  BLE   10$
15081 052724 152777 000040 140262    BISB  #40,@ML.REG+40          ;                                    7132
15082 052732 016705 140644           MOV   ML.DUT,R5
15083 052736 042705 177770           BIC   #177770,R5
15084 052742 142777 000007 140244    BICB  #7,@ML.REG+40
15085 052750 150577 140240           BISB  R5,@ML.REG+40
15086 052754 152777 000010 140312    BISB  #10,@ML.REG+120         ;                                    7135
15087 052762 010277 140216           MOV   R2,@ML.REG+30           ; SECTOR.NO,*                        7136
15088 052766 012777 177400 140170    MOV   #-400,@ML.REG+10        ;                                    7137
15089 052774 012777 011600 140172    MOV   #IO.BUF,@ML.REG+20      ;                                    7138
15090 053002 012777 000071 140144    MOV   #71,@ML.REG             ;                                    7139
15091 053010 012704 000001           MOV   #1,R4                   ; *,$$TMP2                           7140
15092 053014 001411            15$:  BEQ   18$
15093 053016 016705 127074           MOV   L$DLY,R5                ; *,$$TMP1
15094 053022 001404                  BEQ   17$
15095 053024 005066 000012     16$:  CLR   12(SP)                  ; $$TMP
15096 053030 005305                  DEC   R5                      ; $$TMP1
15097 053032 001374                  BNE   16$
15098 053034 005304            17$:  DEC   R4                      ; $$TMP2
15099 053036 000766                  BR    15$
15100 053040 012766 177777 000006 18$:  MOV   #-1,6(SP)            ; *,WRD.CNT                          7141
15101 053046 005266 000006     19$:  INC   6(SP)                   ; WRD.CNT                            7145
15102 053052 017767 140326 140040    MOV   @ML.REG+230,PD.TEMP     ;                                    7146
15103 053060 152777 000020 140206    BISB  #20,@ML.REG+120         ;                                    7147
15104 053066 012704 000001           MOV   #1,R4                   ; *,$$TMP2                           7148
15105 053072 001411            20$:  BEQ   23$
15106 053074 016705 127016           MOV   L$DLY,R5                ; *,$$TMP1
15107 053100 001404                  BEQ   22$
15108 053102 005066 000012     21$:  CLR   12(SP)                  ; $$TMP
15109 053106 005305                  DEC   R5                      ; $$TMP1
15110 053110 001374                  BNE   21$
15111                          ;ML4                                                  14-May-1981 13:48:54    TOPS
15112                          ;                                                     14-May-1981 13:05:08    PA:<
15113
15114 053112 005304            22$:  DEC   R4                      ; $$TMP2
15115 053114 000766                  BR    20$
15116 053116 017767 140222 136026 23$:  MOV   @ML.REG+170,D1.TEMP
15117 053124 017767 140224 136022    MOV   @ML.REG+200,D2.TEMP
15118 053132 017767 140176 136016    MOV   @ML.REG+160,E2.TEMP
15119 053140 012716 177777           MOV   #-1,(SP)                ; *,NIB.PTR                          7150
15120 053144 005216            24$:  INC   (SP)                    ; NIB.PTR                            7154
15121 053146 011605                  MOV   (SP),R5                 ; NIB.PTR,*                          7156
15122 053150 006205                  ASR   R5
15123 053152 006205                  ASR   R5
15124 053154 006205                  ASR   R5
15125 053156 062705 013120           ADD   #PD.TEMP,R5
15126 053162 010546                  MOV   R5,-(SP)
```

```
15127 053164  016646  000002                MOV     2(SP),-(SP)             ; NIB.PTR,*
15128 053170  042716  177770                BIC     #177770,(SP)
15129 053174  012746  000001                MOV     #1,-(SP)
15130 053200  005046                        CLR     -(SP)
15131 053202  004767  127732                JSR     PC,BL$GT2
15132 053206  062706  000010                ADD     #10,SP
15133 053212  005700                        TST     R0
15134 053214  001011                        BNE     25$
15135 053216  011646                        MOV     (SP),-(SP)              ; NIB.PTR,*                             7158
15136 053220  010146                        MOV     R1,-(SP)                ; NIB.PAT,*
15137 053222  012746  000016                MOV     #16,-(SP)
15138 053226  060616                        ADD     SP,(SP)                 ; ERR.FLG,*
15139 053230  004767  142720                JSR     PC,TST.LNG.WRD
15140 053234  062706  000006                ADD     #6,SP
15141 053240  016605  000010          25$:  MOV     10(SP),R5               ; ERR.FLG,*                             7161
15142 053244  032705  000001                BIT     #1,R5
15143 053250  001012                        BNE     26$
15144 053252  021627  000011                CMP     (SP),#11                ; NIB.PTR,*
15145 053256  001332                        BNE     24$
15146 053260  032705  000001                BIT     #1,R5                   ;                                       7164
15147 053264  001004                        BNE     26$
15148 053266  026627  000006  000177        CMP     6(SP),#177              ; WRD.CNT,*
15149 053274  001264                        BNE     19$
15150 053276  005004                  26$:  CLR     R4                      ;                                       7167
15151 053300  026627  000002  000003        CMP     2(SP),#3                ; PASS.CNT,*
15152 053306  001002                        BNE     27$
15153 053310  005204                        INC     R4
15154 053312  000403                        BR      28$
15155 053314  020527  000001          27$:  CMP     R5,#1
15156 053320  001030                        BNE     31$
15157 053322  006004                  28$:  ROR     R4                      ;                                       7169
15158 053324  103010                        BCC     29$
15159 053326  005705                        TST     R5
15160 053330  001006                        BNE     29$
15161 053332  012766  000001  000004        MOV     #1,4(SP)                ; *,DONE.FLG                            7172
15162 053340  010267  136220                MOV     R2,GOOD.BLK             ; SECTOR.NO,*                           7173
15163 053344  000405                        BR      30$                     ;                                       7169
15164 053346  066702  137552          29$:  ADD     RAS.INC,R2              ; *,SECTOR.NO                           7177
15165 053352  012766  177777  000002        MOV     #-1,2(SP)               ; *,PASS.CNT                            7178
15166                             ;ML4                                                  14-May-1981 13:48:54    TOPS
15167                             ;                                                     14-May-1981 13:05:08    PA:<
15168
15169 053360  026627  000004  000001  30$:  CMP     4(SP),#1                ; DONE.FLG,*                            7182
15170 053366  001410                        BEQ     32$
15171 053370  016705  136202                MOV     LST.ARR,R5
15172 053374  066705  136162                ADD     ARR.INC,R5
15173 053400  020205                        CMP     R2,R5                   ; SECTOR.NO,*
15174 053402  001402                  31$:  BEQ     32$
15175 053404  000167  177040                JMP     2$
15176 053410  104467                  32$:  TRAP    67
15177 053412  006000                        ROR     R0
15178 053414  103002                        BHIS    33$
15179 053416  000167  177010                JMP     1$
15180 053422  016705  136150          33$:  MOV     LST.ARR,R5              ;                                       7187
15181 053426  066705  136130                ADD     ARR.INC,R5
15182 053432  020205                        CMP     R2,R5                   ; SECTOR.NO,*
15183 053434  001026                        BNE     34$
```

```
15184 053436  104455                    TRAP    55                              ;                                       7190
15185 053440  000117                    .WORD   117
15186 053442  010672                    .WORD   INTER
15187 053444  024060                    .WORD   DUMPER
15188 053446  012746  010136            MOV     #FNC.15,-(SP)                   ;                                       7191
15189 053452  012746  007564            MOV     #PHR.10,-(SP)
15190 053456  012746  006442            MOV     #WRD.14,-(SP)
15191 053462  012746  006034            MOV     #THR.FMT,-(SP)
15192 053466  012746  000004            MOV     #4,-(SP)
15193 053472  010600                    MOV     SP,R0                           ; SP,*
15194 053474  104414                    TRAP    14
15195 053476  016700  140076            MOV     ML.LUN,R0                       ;                                       7192
15196 053502  104451                    TRAP    51
15197 053504  104444                    TRAP    44
15198 053506  062706  000012            ADD     #12,SP                          ;                                       7189
15199 053512  062706  000014    34$:    ADD     #14,SP                          ;                                       7029
15200 053516  000207                    RTS     PC
15201
15202                                 ; Routine Size:  287 words
15203                                 ; Maximum stack depth per invocation:  17 words
15208
15209
15213
15214                                         .SBTTL  T29
15218 053520                          T29::
15219 053520  004767  176676          1$:     JSR     PC,$T29                 ;                                       7194
15220 053524  104466                          TRAP    66
15221                                 ;ML4                                                    14-May-1981 13:48:54    TOPS
15222                                 ;                                                       14-May-1981 13:05:08    PA:<
15223
15224 053526  006000                          ROR     R0
15225 053530  103773                          BLO     1$
15226 053532  000207                          RTS     PC
15227
15228                                 ; Routine Size:  6 words
15229                                 ; Maximum stack depth per invocation:  0 words
15234
15235
15236 ;           7197  !<BLF/PAGE>
```

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14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (80)

```
15238 ;ML4
15239 ;
15240
15241 ;          7198  !
15242 ;          7199  !
15243 ;          7200  BGNTST;
15244 ;          7201
15245 ;          7202  !++
15246 ;          7203  ! TEST NUMBER:  TST 30
15247 ;          7204  !
15248 ;          7205  ! TEST NAME:    REFRESH TIMING TEST
15249 ;          7206  !
15250 ;          7207  ! TEST DESCRIPTION:
15251 ;          7208  !
15252 ;          7209  !       TEST THE MEMORY ARRAY MODULES
15253 ;          7210  !       REFRESH TIMING AND CONTROL LOGIC
15254 ;          7211  !       REG BY:
15255 ;          7212  !
15256 ;          7213  !       1.  WRITING ALL ONES INTO THE
15257 ;          7214  !           GOOD BLOCK.
15258 ;          7215  !
15259 ;          7216  !       2.  DELAY FOR 2 MS
15260 ;          7217  !
15261 ;          7218  !       3.  READ THE GOOD BLOCK FOR ONES.
15262 ;          7219  !           KEEP COUNT OF BAD NIBBLES
15263 ;          7220  !           ENCOUNTERED
15264 ;          7221  !
15265 ;          7222  !       4.  ALLOW A BAD NIBBLE THRESHOLD
15266 ;          7223  !           OF 20 BAD NIBBLES OUT OF THE
15267 ;          7224  !           1280 NIBBLES TESTED.
15268 ;          7225  !
15269 ;          7226  !       5.  IF THRESHOLD IS EXCEEDED THEN
15270 ;          7227  !           REPORT ERROR AND DROP THE UNIT.
15271 ;          7228  !
15272 ;          7229  ! IMPLICIT INPUTS:
15273 ;          7230  !
15274 ;          7231  !       PD_TEMP:
15275 ;          7232  !       A BIT VECTOR OF 16 BITS WHERE
15276 ;          7233  !       THE READ PROM DATA IS STORED
15277 ;          7234  !       AND ACCESSED FROM.
15278 ;          7235  !
15279 ;          7236  !--
15280 ;          7237
15281 ;          7238  local
15282 ;          7239      TST_PAT,                          !TEST PATTERN
15283 ;          7240      ERR_CNT,                          !ERROR COUNT
15284 ;          7241      ERR_FLG;                          !ERROR FLAG
15285 ;          7242
15286 ;          7243  BGNSUB;
15287 ;          7244  CLR_MBUS;
15288 ;          7245  ERR_CNT = ZERO;
15289 ;          7246  TST_PAT = ONES;
15290 ;          7247  MLD1 = .TST_PAT;                      !LOAD DATA DIAG REGS WITH TST PAT
15291 ;          7248  MLD2 = .TST_PAT;
15292 ;          7249  MLE2 = .TST_PAT;
```

```
15294 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
15295 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (80)
15296
15297 ;          7250  DAT_DM_XFER ();                        !SET UP A DATA DIAG MODE XFERR
15298 ;          7251  MLCS1 = write;                         !DO A WRITE FUNCTION
15299 ;          7252
15300 ;          7253  incr WRD_CNT from 0 to 127 do          !WRITE BLOCK WITH TST PAT
15301 ;          7254      begin
15302 ;          7255      DELAY (ONE_US);
15303 ;          7256      DAT_CLK = ONE;
15304 ;          7257      end;
15305 ;          7258
15306 ;          7259  CLR_MBUS;
15307 ;          7260  DAT_DM_XFER ();                        !SET UP A DATA DIAG MODE XFERR
15308 ;          7261  MLCS1 = read;                          !DO A READ FUNCTION
15309 ;          7262  DELAY (TWO_TH_US);                     !DELAY FOR 2 MS
15310 ;          7263
15311 ;          7264  incr WRD_CNT from 0 to 127 do          !READ THE BLOCK
15312 ;          7265      begin
15313 ;          7266      PD_TEMP = .MLPD;                   !GET THE PROM DATA
15314 ;          7267      DAT_CLK = ONE;                     !CLOCK DATA WORD INTO DIAG REG
15315 ;          7268      DELAY (ONE_US);
15316 ;          7269      RD_LNG_WRD;                        !READ THE DIAG REG
15317 ;          7270
15318 ;          7271      incr NIB_PTR from 0 to 9 do        !LOOK AT 10 NIBBLES
15319 ;          7272          begin
15320 ;          7273
15321 ;          7274          if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);
15322 ;          7275
15323 ;          7276                                         !FIND GOOD NIBBLES AND COMPARE THEM
15324 ;          7277
15325 ;          7278          if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + 1; !INCREMENT ERROR COUNT IF ERR_FLG IS SET
15326 ;          7279
15327 ;          7280          end;
15328 ;          7281
15329 ;          7282      end;
15330 ;          7283
15331 ;          7284  ENDSUB;
15332 ;          7285
15333 ;          7286  if .ERR_CNT gtr 20                     !ALLOW 20 NIBBLES TO FAIL
15334 ;          7287  then
15335 ;          7288      begin                              !ERROR IF GTR 20
15336 ;          7289      ERRDF (80, ASYNC, DUMPER);
15337 ;          7290      PRINTB (FIV_FMT, WRD_22, PHR_4, WRD_12, FNC_16, WRD_48);
15338 ;          7291      DODU (.ML_LUN);
15339 ;          7292      DOCLN;
15340 ;          7293      end;
15341 ;          7294
15342 ;          7295  ENDTST;
15346
15347                                  .SBTTL  $T30
```

```
15355 053534  004167  130356          $T30:   JSR     R1,$SAVE5                       ;                                       7196
15356 053540  024646                          CMP     -(SP),-(SP)
15357 053542  104402                  1$:     TRAP    2                               ;                                       7241
15358 053544  152777  000040  137442          BISB    #40,@ML.REG+40                  ;                                       7243
15359 053552  016703  140024                  MOV     ML.DUT,R3
15360 053556  042703  177770                  BIC     #177770,R3
15361 053562  142777  000007  137424          BICB    #7,@ML.REG+40
15362 053570  150377  137420                  BISB    R3,@ML.REG+40
15363 053574  005005                          CLR     R5                              ; ERR.CNT                               7245
15364 053576  012704  177777                  MOV     #-1,R4                          ; *,TST.PAT                             7246
15365 053602  010477  137536                  MOV     R4,@ML.REG+170                  ; TST.PAT,*                             7247
15366 053606  010477  137542                  MOV     R4,@ML.REG+200                  ; TST.PAT,*                             7248
15367 053612  010477  137516                  MOV     R4,@ML.REG+160                  ; TST.PAT,*                             7249
15368 053616  004767  140340                  JSR     PC,DAT.DM.XFER                  ;                                       7250
15369 053622  012777  000061  137324          MOV     #61,@ML.REG                     ;                                       7251
15370 053630  005001                          CLR     R1                              ; WRD.CNT                               7253
15371 053632  012702  000001          2$:     MOV     #1,R2                           ; *,$$TMP2                              7255
15372 053636  001411                  3$:     BEQ     6$
15373 053640  016703  126252                  MOV     L$DLY,R3                        ; *,$$TMP1
15374 053644  001404                          BEQ     5$
15375 053646  005066  000002          4$:     CLR     2(SP)                           ; $$TMP
15376 053652  005303                          DEC     R3                              ; $$TMP1
15377 053654  001374                          BNE     4$
15378 053656  005302                  5$:     DEC     R2                              ; $$TMP2
15379 053660  000766                          BR      3$
15380 053662  152777  000020  137404  6$:     BISB    #20,@ML.REG+120                 ;                                       7256
15381 053670  005201                          INC     R1                              ; WRD.CNT                               7253
15382 053672  020127  000177                  CMP     R1,#177                         ; WRD.CNT,*
15383 053676  003755                          BLE     2$
15384 053700  152777  000040  137306          BISB    #40,@ML.REG+40                  ;                                       7257
15385 053706  016703  137670                  MOV     ML.DUT,R3
15386 053712  042703  177770                  BIC     #177770,R3
15387 053716  142777  000007  137270          BICB    #7,@ML.REG+40
15388 053724  150377  137264                  BISB    R3,@ML.REG+40
15389 053730  004767  140226                  JSR     PC,DAT.DM.XFER                  ;                                       7260
15390 053734  012777  000071  137212          MOV     #71,@ML.REG                     ;                                       7261
15391 053742  012702  003720                  MOV     #3720,R2                        ; *,$$TMP2                              7262
15392 053746  001411                  7$:     BEQ     10$
15393 053750  016703  126142                  MOV     L$DLY,R3                        ; *,$$TMP1
15394 053754  001404                          BEQ     9$
15395 053756  005066  000002          8$:     CLR     2(SP)                           ; $$TMP
15396 053762  005303                          DEC     R3                              ; $$TMP1
15397 053764  001374                          BNE     8$
15398 053766  005302                  9$:     DEC     R2                              ; $$TMP2
15399 053770  000766                          BR      7$
15400 053772  005001                  10$:    CLR     R1                              ; WRD.CNT                               7264
15401 053774  017767  137404  137116  11$:    MOV     @ML.REG+230,PD.TEMP             ;                                       7266
15402 054002  152777  000020  137264          BISB    #20,@ML.REG+120                 ;                                       7267
15403 054010  012702  000001                  MOV     #1,R2                           ; *,$$TMP2                              7268
15404 054014  001411                  12$:    BEQ     15$
```

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15406                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
15407                                   ;                                                       14-May-1981 13:05:08    PA:<
15408
15409 054016  016703  126074                     MOV     L$DLY,R3                ; *,$$TMP1
15410 054022  001404                             BEQ     14$
15411 054024  005066  000002             13$:    CLR     2(SP)                   ; $$TMP
15412 054030  005303                             DEC     R3                      ; $$TMP1
15413 054032  001374                             BNE     13$
15414 054034  005302                     14$:    DEC     R2                      ; $$TMP2
15415 054036  000766                             BR      12$
15416 054040  017767  137300  135104     15$:    MOV     @ML.REG+170,D1.TEMP
15417 054046  017767  137302  135100             MOV     @ML.REG+200,D2.TEMP
15418 054054  017767  137254  135074             MOV     @ML.REG+160,E2.TEMP
15419 054062  005002                             CLR     R2                      ; NIB.PTR                                       7271
15420 054064  010203                     16$:    MOV     R2,R3                   ; NIB.PTR,*                                     7274
15421 054066  006203                             ASR     R3
15422 054070  006203                             ASR     R3
15423 054072  006203                             ASR     R3
15424 054074  062703  013120                     ADD     #PD.TEMP,R3
15425 054100  010346                             MOV     R3,-(SP)
15426 054102  010246                             MOV     R2,-(SP)                ; NIB.PTR,*
15427 054104  042716  177770                     BIC     #177770,(SP)
15428 054110  012746  000001                     MOV     #1,-(SP)
15429 054114  005046                             CLR     -(SP)
15430 054116  004767  127016                     JSR     PC,BL$GT2
15431 054122  062706  000010                     ADD     #10,SP
15432 054126  005700                             TST     R0
15433 054130  001011                             BNE     17$
15434 054132  010246                             MOV     R2,-(SP)                ; NIB.PTR,*
15435 054134  010446                             MOV     R4,-(SP)                ; TST.PAT,*
15436 054136  012746  000006                     MOV     #6,-(SP)
15437 054142  060616                             ADD     SP,(SP)                 ; ERR.FLG,*
15438 054144  004767  142004                     JSR     PC,TST.LNG.WRD
15439 054150  062706  000006                     ADD     #6,SP
15440 054154  021627  000001             17$:    CMP     (SP),#1                 ; ERR.FLG,*                                     7278
15441 054160  001001                             BNE     18$
15442 054162  005205                             INC     R5                      ; ERR.CNT
15443 054164  005202                     18$:    INC     R2                      ; NIB.PTR                                       7271
15444 054166  020227  000011                     CMP     R2,#11                  ; NIB.PTR,*
15445 054172  003734                             BLE     16$
15446 054174  005201                             INC     R1                      ; WRD.CNT                                       7264
15447 054176  020127  000177                     CMP     R1,#177                 ; WRD.CNT,*
15448 054202  003674                             BLE     11$
15449 054204  104467                             TRAP    67                      ;                                               7282
15450 054206  006000                             ROR     R0
15451 054210  103002                             BHIS    19$
15452 054212  000167  177324                     JMP     1$
15453 054216  020527  000024             19$:    CMP     R5,#24                  ; ERR.CNT,*                                     7286
15454 054222  003432                             BLE     20$
15455 054224  104455                             TRAP    55                      ;                                               7289
15456 054226  000120                             .WORD   120
15457 054230  010464                             .WORD   ASYNC
15458 054232  024060                             .WORD   DUMPER
15459 054234  012746  007026                     MOV     #WRD.48,-(SP)           ;                                               7290
15460 054240  012746  010150                     MOV     #FNC.16,-(SP)
```

```
15462                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
15463                                   ;                                                       14-May-1981 13:05:08    PA:<
15464
15465 054244  012746  006426                    MOV     #WRD.12,-(SP)
15466 054250  012746  007454                    MOV     #PHR.4,-(SP)
15467 054254  012746  006530                    MOV     #WRD.22,-(SP)
15468 054260  012746  006062                    MOV     #FIV.FMT,-(SP)
15469 054264  012746  000006                    MOV     #6,-(SP)
15470 054270  010600                            MOV     SP,R0                           ; SP,*
15471 054272  104414                            TRAP    14
15472 054274  016700  137300                    MOV     ML.LUN,R0                       ;                       7291
15473 054300  104451                            TRAP    51
15474 054302  104444                            TRAP    44
15475 054304  062706  000016                    ADD     #16,SP                          ;                       7288
15476 054310  022626                    20$:    CMP     (SP)+,(SP)+                     ;                       7196
15477 054312  000207                            RTS     PC
15478
15479                                   ; Routine Size:  184 words
15480                                   ; Maximum stack depth per invocation:  15 words
15485
15486
15490
15491                                           .SBTTL  T30
15495 054314                            T30::
15496 054314  004767  177214            1$:     JSR     PC,$T30                         ;                       7293
15497 054320  104466                            TRAP    66
15498 054322  006000                            ROR     R0
15499 054324  103773                            BLO     1$
15500 054326  000207                            RTS     PC
15501
15502                                   ; Routine Size:  6 words
15503                                   ; Maximum stack depth per invocation:  0 words
15508
15509
15510 ;          7296  !<BLF/PAGE>
```

```
15512 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
15513 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (81)
15514
15515 ;          7297  !
15516 ;          7298  BGNTST;
15517 ;          7299
15518 ;          7300  !++
15519 ;          7301  ! TEST NUMBER:  TST 31
15520 ;          7302  !
15521 ;          7303  ! TEST NAME:    ADDRESS COUNTER TEST
15522 ;          7304  !
15523 ;          7305  ! TEST DESCRIPTION:
15524 ;          7306  !       TEST THE ABILITY OF THE ADDRESS
15525 ;          7307  !       COUNTER TO SUCCESSFULLY COUNT
15526 ;          7308  !       FROM BLOCK ZERO THROUGH THE
15527 ;          7309  !       DEVICES LAST BLOCK BY:
15528 ;          7310  !
15529 ;          7311  !       1.  WRITING THE LAST BLOCK WITH ONES PATTERN.
15530 ;          7312  !
15531 ;          7313  !       2.  STARTING AT BLOCK ZERO WRITE ZEROES INTO ALL BLOCK UP TO THE
15532 ;          7314  !           LAST BLOCK ADRS MINUS ONE.
15533 ;          7315  !
15534 ;          7316  !           READ THE LAST BLOCK FOR ONES AND ERROR IF ZEROES.
15535 ;          7317  !
15536 ;          7318  !       3.  STARTING AT BLOCK ZERO WRITE ZEROES INTO ALL BLOCK THROUGH THE LAST
15537 ;          7319  !           BLOCK.
15538 ;          7320  !
15539 ;          7321  !           READ THE LAST BLOCK FOR ZEROES AND ERROR IF STILL ONES.
15540 ;          7322  !
15541 ;          7323  ! IMPLICIT INPUTS:
15542 ;          7324  !       PD_TEMP:
15543 ;          7325  !       A BITVECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND ACCESSED FROM.
15544 ;          7326  !--
15545 ;          7327
15546 ;          7328  local
15547 ;          7329      DODU_FLG,                          !DROP UNIT FLAG
15548 ;          7330      ERR_FLG,                           !ERROR FLG
15549 ;          7331      END_CNT,                           !ENDING SECTOR NUMBER
15550 ;          7332      ERR_CNT,                           !COUNTS # OF BAD NIBBLES FOUND IN THE LAST BLOCK
15551 ;          7333      BG_PAT;                            !BACKGROUND PATTERN
15552 ;          7334
15553 ;          7335  BGNSUB;
15554 ;          7336  CLR_MBUS;
15555 ;          7337  DODU_FLG = ZERO;
15556 ;          7338  BG_PAT = ONES;                         !BACKGROUND PAT OF ONES
15557 ;          7339  MLD1 = .BG_PAT;                        !LOAD DATA DIAGS WITH BG PAT
15558 ;          7340  MLD2 = .BG_PAT;
15559 ;          7341  MLE2 = .BG_PAT;
15560 ;          7342  DAT_DM = ONE;                          !SET DATA DIAG MODE
15561 ;          7343  LAST_BLK_XFER ();                      !SET UP A LAST BLOCK XFERR
15562 ;          7344  MLCST = write;                         !DO A WRITE FUNCTION
15563 ;          7345
15564 ;          7346  incr WRD_CNT from 0 to 127 do          !WRITE THE LAST BLOCK WITH THE BG PATTERN
15565 ;          7347      begin
15566 ;          7348      DELAY (ONE_US);
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (81)

;          7349      DAT_CLK = ONE;
;          7350      end;
;          7351
;          7352  CLR_MBUS;
;          7353  DAT_DM = ONE;                          !SET DATA DIAG MODE
;          7354  LAST_BLK_XFER ();                      !SET UP A LAST BLOCK XFERR
;          7355  MLCST = read;                          !DO A READ FUNCTION
;          7356  DELAY (ONE_US);
;          7357  ERR_CNT = ZEROES;                      !CLEAR THE ERROR COUNT
;          7358
;          7359  incr WD_CNT from 0 to 127 do          !READ THE LAST BLOCK FOR BG PATTERN
;          7360      begin
;          7361      PD_TEMP = .MLPD;                   !GET PROM DATA
;          7362      DAT_CLK = ONE;                     !CLOCK OUT THE DATA WORD
;          7363      DELAY (ONE_US);
;          7364      RD_LNG_WRD;                        !READ THE DATA WORD
;          7365
;          7366      incr NIB_PTR from 0 to 9 do        !LOOK AT 10 NIBBLES
;          7367          begin
;          7368
;          7369          if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .BG_PAT, ERR_FLG);
;          7370
;          7371                                         !FIND GOOD NIBBLES AND COMPARE THEM
;          7372
;          7373          IF .ERR_FLG IS_SET
;          7374              THEN ERR_CNT = .ERR_CNT + 1;          !COUNT THE # OF BAD NIBBLES DETECTED
;          7375
;          7376          end;
;          7377
;          7378      end;
;          7379
;          7380          if .ERR_CNT GTR 10             !IS ERROR COUNT > THRESHOLD
;          7381          then
;          7382              begin
;          7383              ERRDF (81, INTER, DUMPER);
;          7384              PRINTB (THR_FMT, PHR_4, WRD_13, FNC_22);
;          7385              PRINTB (TWO_FMT, FNC_13, WRD_56);
;          7386              EXIT_TST;
;          7387              end;
;          7388
;          7389  END_CNT = .LST_BLK - 1;                !END AT LAST BLOCK -1
;          7390  MLDT = ZEROES;                         !LOAD DATA DIAG REG WITH COMP BG PAT
;          7391  MLD2 = ZEROES;
;          7392  MLE2 = ZEROES;
;          7393
;          7394  incr TWICE from 0 to 1 do              !REPEAT LOOP TWICE
;          7395      begin
;          7396      CLR_MBUS;
;          7397      ERR_CNT = ZEROES;              !CLEAR THE ERROR COUNT
;          7398      DAT_DM = ONE;                      !SET DATA DIAG MODE
;          7399      FIRST_BLK_XFER ();                 !SET UP A FIRST BLOCK XFERR
;          7400      MLCS1 = write;                     !DO A WRITE FUNCTION
```

```
15624 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
15625 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (81)
15626
15627 ;          7401
15628 ;          7402      incr BLK_CNT from 0 to .END_CNT do          !CLOCK THE ADDRESS COUNTER UP TO END_CNT
15629 ;          7403
15630 ;          7404          incr ADRS_CNT from 0 to 127 do
15631 ;          7405              begin
15632 ;          7406              DAT_CLK = ONE;
15633 ;          7407              end;
15634 ;          7408
15635 ;          7409      CLR_MBUS;
15636 ;          7410      DAT_DM = ONE;                               !SET DATA DIAG MODE
15637 ;          7411      LAST_BLK_XFER ();                           !SET UP A LAST BLOCK XFERR
15638 ;          7412      MLCST = read;                               !DO A READ FUNCTION
15639 ;          7413      DELAY (ONE_US);
15640 ;          7414
15641 ;          7415      incr WD_CNT from 0 to 127 do                !READ THE LAST BLOCK FOR BG PATTERN
15642 ;          7416          begin
15643 ;          7417          PD_TEMP = .MLPD;                        !GET THE PROM DATA
15644 ;          7418          DAT_CLK = ONE;                          !CLOCK OUT DATA WORD
15645 ;          7419          DELAY (ONE_US);
15646 ;          7420          RD_LNG_WRD;                             !READ DATA WORD
15647 ;          7421
15648 ;          7422          incr NIB_PTR from 0 to 9 do             !LOOK AT 10 NIBBLES
15649 ;          7423              begin
15650 ;          7424
15651 ;          7425              if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .BG_PAT, ERR_FLG);
15652 ;          7426
15653 ;          7427                                                  !FIND GOOD NIBBLES AND COMPARE THEM
15654 ;          7428
15655 ;          7429              IF .ERR_FLG IS_SET                                !COUNT # OF BAD NIBBLES DETECTED
15656 ;          7430                  THEN ERR_CNT = .ERR_CNT + 1;
15657 ;          7431              end;
15658 ;          7432
15659 ;          7433          end;
15660 ;          7434
15661 ;          7435              IF .ERR_CNT GTR 10                    !IS ERROR COUNT > TRESHOLD
15662 ;          7436              then
15663 ;          7437                  begin
15664 ;          7438                  ERRDF (82, ASYNC, DUMPER);
15665 ;          7439                  PRINTB (THR_FMT, WRD_50, WRD_51, WRD_10);
15666 ;          7440                  DODU_FLG = ONE;
15667 ;          7441                  end;
15668 ;          7442
15669 ;          7443
15670 ;          7444      END_CNT = .END_CNT + 1;                     !NOW END AT THE LAST BLOCK
15671 ;          7445      BG_PAT = not .BG_PAT;                       !COMPLIMENT THE BG PATTERN AND REPEAT
15672 ;          7446      end;
15673 ;          7447
15674 ;          7448  ENDSUB;
15675 ;          7449
15676 ;          7450  if .DODU_FLG IS_SET                            !DROP THIS UNIT IF DODU_FLG IS_SET
15677 ;          7451  then
15678 ;          7452      begin
```

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15680 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
15681 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (81)
15682
15683 ;          7453      DODU (.ML_LUN);
15684 ;          7454      DOCLN;
15685 ;          7455      end;
15686 ;          7456
15687 ;          7457  ENDTST;
15691
15692                                        .SBTTL  $T31
15696 054330  004167  127562          $T31: JSR     R1,$SAVE5                 ;                                   7295
15697 054334  162706  000012                SUB     #12,SP
15698 054340  104402                  1$:   TRAP    2                         ;                                   7333
15699 054342  152777  000040  136644        BISB    #40,@ML.REG+40            ;                                   7335
15700 054350  016705  137226                MOV     ML.DUT,R5
15701 054354  042705  177770                BIC     #177770,R5
15702 054360  142777  000007  136626        BICB    #7,@ML.REG+40
15703 054366  150577  136622                BISB    R5,@ML.REG+40
15704 054372  005066  000004                CLR     4(SP)                     ; DODU.FLG                          7337
15705 054376  012702  177777                MOV     #-1,R2                    ; *,BG.PAT                          7338
15706 054402  010277  136736                MOV     R2,@ML.REG+170            ; BG.PAT,*                          7339
15707 054406  010277  136742                MOV     R2,@ML.REG+200            ; BG.PAT,*                          7340
15708 054412  010277  136716                MOV     R2,@ML.REG+160            ; BG.PAT,*                          7341
15709 054416  152777  000010  136650        BISB    #10,@ML.REG+120           ;                                   7342
15710 054424  004767  141472                JSR     PC,LAST.BLK.XFER          ;                                   7343
15711 054430  012777  000061  136516        MOV     #61,@ML.REG               ;                                   7344
15712 054436  005003                        CLR     R3                        ; WRD.CNT                           7346
15713 054440  012704  000001          2$:   MOV     #1,R4                     ; *,$$TMP2                          7348
15714 054444  001411                  3$:   BEQ     6$
15715 054446  016705  125444                MOV     L$DLY,R5                  ; *,$$TMP1
15716 054452  001404                        BEQ     5$
15717 054454  005066  000010          4$:   CLR     10(SP)                    ; $$TMP
15718 054460  005305                        DEC     R5                        ; $$TMP1
15719 054462  001374                        BNE     4$
15720 054464  005304                  5$:   DEC     R4                        ; $$TMP2
15721 054466  000766                        BR      3$
15722 054470  152777  000020  136576  6$:   BISB    #20,@ML.REG+120           ;                                   7349
15723 054476  005203                        INC     R3                        ; WRD.CNT                           7346
15724 054500  020327  000177                CMP     R3,#177                   ; WRD.CNT,*
15725 054504  003755                        BLE     2$
15726 054506  152777  000040  136500        BISB    #40,@ML.REG+40            ;                                   7350
15727 054514  016705  137062                MOV     ML.DUT,R5
15728 054520  042705  177770                BIC     #177770,R5
15729 054524  142777  000007  136462        BICB    #7,@ML.REG+40
15730 054532  150577  136456                BISB    R5,@ML.REG+40
15731 054536  152777  000010  136530        BISB    #10,@ML.REG+120           ;                                   7353
15732 054544  004767  141352                JSR     PC,LAST.BLK.XFER          ;                                   7354
15733 054550  012777  000071  136376        MOV     #71,@ML.REG               ;                                   7355
15734 054556  012704  000001                MOV     #1,R4                     ; *,$$TMP2                          7356
```

```
15736                                   ;ML4
15737                                   ;
15738
15739 054562 001411                7$:  BEQ   10$
15740 054564 016705 125326              MOV   L$DLY,R5          ; *,$$TMP1
15741 054570 001404                     BEQ   9$
15742 054572 005066 000010         8$:  CLR   10(SP)            ; $$TMP
15743 054576 005305                     DEC   R5                ; $$TMP1
15744 054600 001374                     BNE   8$
15745 054602 005304                9$:  DEC   R4                ; $$TMP2
15746 054604 000766                     BR    7$
15747 054606 005016                10$: CLR   (SP)              ; ERR.CNT                7357
15748 054610 005003                     CLR   R3                ; WD.CNT                 7359
15749 054612 017767 136566 136300  11$: MOV   @ML.REG+230,PD.TEMP ;                       7361
15750 054620 152777 000020 136446       BISB  #20,@ML.REG+120   ;                        7362
15751 054626 012704 000001              MOV   #1,R4             ; *,$$TMP2               7363
15752 054632 001411                12$: BEQ   15$
15753 054634 016705 125256              MOV   L$DLY,R5          ; *,$$TMP1
15754 054640 001404                     BEQ   14$
15755 054642 005066 000010         13$: CLR   10(SP)            ; $$TMP
15756 054646 005305                     DEC   R5                ; $$TMP1
15757 054650 001374                     BNE   13$
15758 054652 005304                14$: DEC   R4                ; $$TMP2
15759 054654 000766                     BR    12$
15760 054656 017767 136462 134266  15$: MOV   @ML.REG+170,D1.TEMP
15761 054664 017767 136464 134262       MOV   @ML.REG+200,D2.TEMP
15762 054672 017767 136436 134256       MOV   @ML.REG+160,E2.TEMP
15763 054700 005005                     CLR   R5                ; NIB.PTR                7366
15764 054702 010504                16$: MOV   R5,R4             ; NIB.PTR,*              7369
15765 054704 006204                     ASR   R4
15766 054706 006204                     ASR   R4
15767 054710 006204                     ASR   R4
15768 054712 062704 013120              ADD   #PD.TEMP,R4
15769 054716 010446                     MOV   R4,-(SP)
15770 054720 010546                     MOV   R5,-(SP)          ; NIB.PTR,*
15771 054722 042716 177770              BIC   #177770,(SP)
15772 054726 012746 000001              MOV   #1,-(SP)
15773 054732 005046                     CLR   -(SP)
15774 054734 004767 126200              JSR   PC,BL$GT2
15775 054740 062706 000010              ADD   #10,SP
15776 054744 005700                     TST   R0
15777 054746 001011                     BNE   17$
15778 054750 010546                     MOV   R5,-(SP)          ; NIB.PTR,*
15779 054752 010246                     MOV   R2,-(SP)          ; BG.PAT,*
15780 054754 012746 000014              MOV   #14,-(SP)
15781 054760 060616                     ADD   SP,(SP)           ; ERR.FLG,*
15782 054762 004767 141166              JSR   PC,TST.LNG.WRD
15783 054766 062706 000006              ADD   #6,SP
15784 054772 026627 000006 000001  17$: CMP   6(SP),#1          ; ERR.FLG,*              7373
15785 055000 001001                     BNE   18$
15786 055002 005216                     INC   (SP)              ; ERR.CNT                7374
15787 055004 005205                18$: INC   R5                ; NIB.PTR                7366
15788 055006 020527 000011              CMP   R5,#11            ; NIB.PTR,*
15789 055012 003733                     BLE   16$
15790 055014 005203                     INC   R3                ; WD.CNT                 7359
```

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15792                          ;ML4                                                    14-May-1981 13:48:54    TOPS
15793                          ;                                                       14-May-1981 13:05:08    PA:<
15794
15795 055016  020327  000177            CMP     R3,#177                 ; WD.CNT,*
15796 055022  003673                    BLE     11$
15797 055024  021627  000012            CMP     (SP),#12                ; ERR.CNT,*                             7380
15798 055030  003437                    BLE     19$
15799 055032  104455                    TRAP    55                      ;                                       7383
15800 055034  000121                    .WORD   121
15801 055036  010672                    .WORD   INTER
15802 055040  024060                    .WORD   DUMPER
15803 055042  012746  010230            MOV     #FNC.22,-(SP)           ;                                       7384
15804 055046  012746  006436            MOV     #WRD.13,-(SP)
15805 055052  012746  007454            MOV     #PHR.4,-(SP)
15806 055056  012746  006034            MOV     #THR.FMT,-(SP)
15807 055062  012746  000004            MOV     #4,-(SP)
15808 055066  010600                    MOV     SP,R0                   ; SP,*
15809 055070  104414                    TRAP    14
15810 055072  012716  007122            MOV     #WRD.56,(SP)            ;                                       7385
15811 055076  012746  010112            MOV     #FNC.13,-(SP)
15812 055102  012746  006024            MOV     #TWO.FMT,-(SP)
15813 055106  012746  000003            MOV     #3,-(SP)
15814 055112  010600                    MOV     SP,R0                   ; SP,*
15815 055114  104414                    TRAP    14
15816 055116  104463                    TRAP    63
15817 055120  062706  000020            ADD     #20,SP                  ;                                       7380
15818 055124  000167  000606            JMP     39$                     ;                                       7382
15819 055130  016766  134436  000002  19$:  MOV     LST.BLK,2(SP)           ; *,END.CNT                             7389
15820 055136  005366  000002            DEC     2(SP)                   ; END.CNT
15821 055142  005077  136176            CLR     @ML.REG+170             ;                                       7390
15822 055146  005077  136202            CLR     @ML.REG+200             ;                                       7391
15823 055152  005077  136156            CLR     @ML.REG+160             ;                                       7392
15824 055156  005001                    CLR     R1                      ; TWICE                                 7394
15825 055160  152777  000040  136026  20$:  BISB    #40,@ML.REG+40          ;                                       7395
15826 055166  016705  136410            MOV     ML.DUT,R5
15827 055172  042705  177770            BIC     #177770,R5
15828 055176  142777  000007  136010    BICB    #7,@ML.REG+40
15829 055204  150577  136004            BISB    R5,@ML.REG+40
15830 055210  005016                    CLR     (SP)                    ; ERR.CNT                               7397
15831 055212  152777  000010  136054    BISB    #10,@ML.REG+120         ;                                       7398
15832 055220  004767  140614            JSR     PC,FIRST.BLK.XFER       ;                                       7399
15833 055224  012777  000061  135722    MOV     #61,@ML.REG             ;                                       7400
15834 055232  005004                    CLR     R4                      ; BLK.CNT                               7402
15835 055234  000411                    BR      23$
15836 055236  005005                 21$:  CLR     R5                      ; ADRS.CNT                              7404
15837 055240  152777  000020  136026  22$:  BISB    #20,@ML.REG+120         ;                                       7406
15838 055246  005205                    INC     R5                      ; ADRS.CNT                              7404
15839 055250  020527  000177            CMP     R5,#177                 ; ADRS.CNT,*
15840 055254  003771                    BLE     22$
15841 055256  005204                    INC     R4                      ; BLK.CNT                               7402
15842 055260  020466  000002         23$:  CMP     R4,2(SP)                ; BLK.CNT,END.CNT
15843 055264  003764                    BLE     21$
15844 055266  152777  000040  135720    BISB    #40,@ML.REG+40          ;                                       7407
15845 055274  016705  136302            MOV     ML.DUT,R5
15846 055300  042705  177770            BIC     #177770,R5
```

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15848                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
15849                                   ;                                                       14-May-1981 13:05:08    PA:<
15850
15851 055304  142777  000007  135702          BICB    #7,@ML.REG+40
15852 055312  150577  135676                  BISB    R5,@ML.REG+40
15853 055316  152777  000010  135750          BISB    #10,@ML.REG+120         ;                               7410
15854 055324  004767  140572                  JSR     PC,LAST.BLK.XFER        ;                               7411
15855 055330  012777  000071  135616          MOV     #71,@ML.REG             ;                               7412
15856 055336  012704  000001                  MOV     #1,R4                   ; *,$$TMP2                      7413
15857 055342  001411                  24$:    BEQ     27$
15858 055344  016705  124546                  MOV     L$DLY,R5                ; *,$$TMP1
15859 055350  001404                          BEQ     26$
15860 055352  005066  000010          25$:    CLR     10(SP)                  ; $$TMP
15861 055356  005305                          DEC     R5                      ; $$TMP1
15862 055360  001374                          BNE     25$
15863 055362  005304                  26$:    DEC     R4                      ; $$TMP2
15864 055364  000766                          BR      24$
15865 055366  005003                  27$:    CLR     R3                      ; WD.CNT                        7415
15866 055370  017767  136010  135522  28$:    MOV     @ML.REG+230,PD.TEMP     ;                               7417
15867 055376  152777  000020  135670          BISB    #20,@ML.REG+120         ;                               7418
15868 055404  012704  000001                  MOV     #1,R4                   ; *,$$TMP2                      7419
15869 055410  001411                  29$:    BEQ     32$
15870 055412  016705  124500                  MOV     L$DLY,R5                ; *,$$TMP1
15871 055416  001404                          BEQ     31$
15872 055420  005066  000010          30$:    CLR     10(SP)                  ; $$TMP
15873 055424  005305                          DEC     R5                      ; $$TMP1
15874 055426  001374                          BNE     30$
15875 055430  005304                  31$:    DEC     R4                      ; $$TMP2
15876 055432  000766                          BR      29$
15877 055434  017767  135704  133510  32$:    MOV     @ML.REG+170,D1.TEMP
15878 055442  017767  135706  133504          MOV     @ML.REG+200,D2.TEMP
15879 055450  017767  135660  133500          MOV     @ML.REG+160,E2.TEMP
15880 055456  005005                          CLR     R5                      ; NIB.PTR                       7422
15881 055460  010504                  33$:    MOV     R5,R4                   ; NIB.PTR,*                     7425
15882 055462  006204                          ASR     R4
15883 055464  006204                          ASR     R4
15884 055466  006204                          ASR     R4
15885 055470  062704  013120                  ADD     #PD.TEMP,R4
15886 055474  010446                          MOV     R4,-(SP)
15887 055476  010546                          MOV     R5,-(SP)                ; NIB.PTR,*
15888 055500  042716  177770                  BIC     #177770,(SP)
15889 055504  012746  000001                  MOV     #1,-(SP)
15890 055510  005046                          CLR     -(SP)
15891 055512  004767  125422                  JSR     PC,BL$GT2
15892 055516  062706  000010                  ADD     #10,SP
15893 055522  005700                          TST     R0
15894 055524  001011                          BNE     34$
15895 055526  010546                          MOV     R5,-(SP)                ; NIB.PTR,*
15896 055530  010246                          MOV     R2,-(SP)                ; BG.PAT,*
15897 055532  012746  000014                  MOV     #14,-(SP)
15898 055536  060616                          ADD     SP,(SP)                 ; ERR.FLG,*
15899 055540  004767  140410                  JSR     PC,TST.LNG.WRD
15900 055544  062706  000006                  ADD     #6,SP
15901 055550  026627  000006  000001  34$:    CMP     6(SP),#1                ; ERR.FLG,*                     7429
15902 055556  001001                          BNE     35$
```

```
                                                                                                                    I 10
                                                                                                    14-May-1981 13:48:54    TOPS
                                                                                                    14-May-1981 13:05:08    PA:<
15904                                   ;ML4
15905                                   ;
15906
15907 055560  005216                    INC     (SP)                    ; ERR.CNT                                       7430
15908 055562  005205            35$:    INC     R5                      ; NIB.PTR                                       7422
15909 055564  020527  000011            CMP     R5,#11                  ; NIB.PTR,*
15910 055570  003733                    BLE     33$
15911 055572  005203                    INC     R3                      ; WD.CNT                                        7415
15912 055574  020327  000177            CMP     R3,#177                 ; WD.CNT,*
15913 055600  003673                    BLE     28$
15914 055602  021627  000012            CMP     (SP),#12                ; ERR.CNT,*                                     7435
15915 055606  003425                    BLE     36$
15916 055610  104455                    TRAP    55                      ;                                               7438
15917 055612  000122                    .WORD   122
15918 055614  010464                    .WORD   ASYNC
15919 055616  024060                    .WORD   DUMPER
15920 055620  012746  006406            MOV     #WRD.10,-(SP)           ;                                               7439
15921 055624  012746  007054            MOV     #WRD.51,-(SP)
15922 055630  012746  007046            MOV     #WRD.50,-(SP)
15923 055634  012746  006034            MOV     #THR.FMT,-(SP)
15924 055640  012746  000004            MOV     #4,-(SP)
15925 055644  010600                    MOV     SP,R0                   ; SP,*
15926 055646  104414                    TRAP    14
15927 055650  012766  000001  000016    MOV     #1,16(SP)               ; *,DODU.FLG                                    7440
15928 055656  062706  000012            ADD     #12,SP                  ;                                               7437
15929 055662  005266  000002    36$:    INC     2(SP)                   ; END.CNT                                       7444
15930 055666  005102                    COM     R2                      ; BG.PAT                                        7445
15931 055670  005201                    INC     R1                      ; TWICE                                         7394
15932 055672  020127  000001            CMP     R1,#1                   ; TWICE,*
15933 055676  003002                    BGT     37$
15934 055700  000167  177254            JMP     20$
15935 055704  104467            37$:    TRAP    67                      ;                                               7446
15936 055706  006000                    ROR     R0
15937 055710  103002                    BHIS    38$
15938 055712  000167  176422            JMP     1$
15939 055716  026627  000004  000001    CMP     4(SP),#1                ; DODU.FLG,*                                    7450
15940 055724  001004                    BNE     39$
15941 055726  016700  135646            MOV     ML.LUN,R0               ;                                               7453
15942 055732  104451                    TRAP    51
15943 055734  104444                    TRAP    44
15944 055736  062706  000012    39$:    ADD     #12,SP                  ;                                               7295
15945 055742  000207                    RTS     PC
15946
15947                                   ; Routine Size:  390 words
15948                                   ; Maximum stack depth per invocation:  19 words
15953
15954
15958
```

```
15960                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
15961                                   ;                                                       14-May-1981 13:05:08    PA:<
15962
15963                                           .SBTTL  T31
15967 055744                            T31::
15968 055744  004767  176360            1$:     JSR     PC,$T31                 ;                               7455
15969 055750  104466                            TRAP    66
15970 055752  006000                            ROR     R0
15971 055754  103773                            BLO     1$
15972 055756  000207                            RTS     PC
15973
15974                                   ; Routine Size:  6 words
15975                                   ; Maximum stack depth per invocation:  0 words
15980
15981
15982 ;          7458  !<BLF/PAGE>
```

```
15984 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
15985 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (82)
15986
15987 ;          7459  !
15988 ;          7460  !
15989 ;          7461  BGNTST;
15990 ;          7462
15991 ;          7463  !++
15992 ;          7464  ! TEST NUMBER:  TST 32
15993 ;          7465  !
15994 ;          7466  ! TEST NAME:    ARRAY MODULE SELECTION TEST
15995 ;          7467  !
15996 ;          7468  ! TEST DESCRIPTION:
15997 ;          7469  !
15998 ;          7470  !       TEST FOR UNIQUE ARRAY MODULE
15999 ;          7471  !       SELECTION BY:
16000 ;          7472  !
16001 ;          7473  !       1.  WRITING THE RESPECTIVE ARRAY
16002 ;          7474  !           MODULE POSITION NUMBER INTO
16003 ;          7475  !           THE FIRST GOOD NIBBLE FOUND
16004 ;          7476  !           IN THE ARRAY.  DO FOR ALL
16005 ;          7477  !           PRESENT ARRAYS.
16006 ;          7478  !
16007 ;          7479  !       2.  READ THE ARRAYS FOR THEIR
16008 ;          7480  !           RESPECTIVE POSTION NUMBERS.
16009 ;          7481  !
16010 ;          7482  ! IMPLICIT INPUTS:
16011 ;          7483  !       PD_TEMP:
16012 ;          7484  !       A BIT VECTOR OF 16 BITS WHERE
16013 ;          7485  !       THE READ PROM DATA IS STORED
16014 ;          7486  !       AND ACCESSED FROM.
16015 ;          7487  !
16016 ;          7488  !       IO_BUF :
16017 ;          7489  !       A VECTOR OF 256 WORDS WHERE
16018 ;          7490  !       DATA FOR MBUS READS AND WRITE
16019 ;          7491  !       FUNCTION ARE FOUND.
16020 ;          7492  !
16021 ;          7493  !--
16022 ;          7494
16023 ;          7495  local
16024 ;          7496      WRDS_TSTED,                          !WORDS TESTED
16025 ;          7497      ARR_SEL,                             !ARRAY SELECT
16026 ;          7498      FND_GD_NIB,                          !FOUND GOOD NIBBLE
16027 ;          7499      ARR_NUM;                             !ARRAY NUMBER
16028 ;          7500
16029 ;          7501  ARR_SEL = ZEROES;
16030 ;          7502  ARR_SEL = .ARR_SEL - .ARR_INC;           !START ARR_SEL BACK ONE ARRAY
16031 ;          7503
16032 ;          7504  incr ARR_CNT from 0 to .OP_NUM_ARR do    !TEST ALL PRESENT ARRAYS
16033 ;          7505      begin
16034 ;          7506      CLR_MBUS;
16035 ;          7507      FND_GD_NIB = ZERO;
16036 ;          7508      WRDS_TSTED = ZERO;
16037 ;          7509      DAT_DM = ONE;                        !SET DATA DIAG MODE
16038 ;          7510      MLWC = not 255;                      !LOAD WORD COUNT
```

```
16040 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
16041 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (82)
16042
16043 ;          7511      MLBA = IO_BUF;                     !LOAD IO_BUF
16044 ;          7512      ARR_SEL = .ARR_SEL + .ARR_INC;     !LOOK AT NEXT ARRAY
16045 ;          7513      MLDA = .ARR_SEL;                   !LOAD DSA WITH SELECTED ARRAY AT BLOCK ZERO
16046 ;          7514      MLCS1 = write;                     !DO A WRITE FUNCTION
16047 ;          7515
16048 ;          7516      do                                 !THIS LOOP WRITES ARRAY NUMBERS TO THE ARRAYS
16049 ;          7517          begin
16050 ;          7518          DELAY (ONE_US);
16051 ;          7519          PD_TEMP = .MLPD;               !GET THE PROM DATA
16052 ;          7520          WRDS_TSTED = .WRDS_TSTED + 1;  !COUNT WORDS TESTED
16053 ;          7521
16054 ;          7522          incr CNT from 0 to 8 do        !LOOK AT 9 NIBBLES
16055 ;          7523
16056 ;          7524              if .PD_TEMP [.CNT] IS_NOT_SET   !FIND A GOOD NIBBLE
16057 ;          7525              then
16058 ;          7526                  begin
16059 ;          7527
16060 ;          7528                  case .CNT from 0 to 8 of    !SELECT AND LOAD GOOD NIBBLE WITH ARRAY CNT
16061 ;          7529                      set
16062 ;          7530
16063 ;          7531                      [0] :
16064 ;          7532                          (MLD1)<0, 4> = .ARR_CNT;      !NIBBLE 0
16065 ;          7533
16066 ;          7534                      [1] :
16067 ;          7535                          (MLD1)<4, 4> = .ARR_CNT;      !NIBBLE 1
16068 ;          7536
16069 ;          7537                      [2] :
16070 ;          7538                          (MLD1)<8, 4> = .ARR_CNT;      !NIBBLE 2
16071 ;          7539
16072 ;          7540                      [3] :
16073 ;          7541                          (MLD1)<12, 4> = .ARR_CNT;     !NIBBLE 3
16074 ;          7542
16075 ;          7543                      [4] :
16076 ;          7544                          (MLD2)<0, 4> = .ARR_CNT;      !NIBBLE 4
16077 ;          7545
16078 ;          7546                      [5] :
16079 ;          7547                          (MLD2)<4, 4> = .ARR_CNT;      !NIBBLE 5
16080 ;          7548
16081 ;          7549                      [6] :
16082 ;          7550                          (MLD2)<8, 4> = .ARR_CNT;      !NIBBLE 6
16083 ;          7551
16084 ;          7552                      [7] :
16085 ;          7553                          (MLD2)<12, 4> = .ARR_CNT;     !NIBBLE 7
16086 ;          7554
16087 ;          7555                      [8] :
16088 ;          7556                          (MLE2)<8, 4> = .ARR_CNT;      !NIBBLE 8
16089 ;          7557                      tes;
16090 ;          7558
16091 ;          7559              FND_GD_NIB = ONE;              !SET FOUND GOOD NIBBLE FLG
16092 ;          7560              exitloop;                      !EXIT THE LOOP
16093 ;          7561              end;
16094 ;          7562
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (82)

;          7563          DAT_CLK = ONE;                 !CLOCK GOOD NIBBLE INTO MEMORY & GET NXT PROM WRD
;          7564          end
;          7565      until (.FND_GD_NIB IS_SET ) or (.WRDS_TSTED eql 14);        !DO UNTIL FOUND GOOD NIBBLE OR 14 WRDS TSTED
;          7566
;          7567      if .WRDS_TSTED eql 14          !IF 14 WORDS TSTED
;          7568      then
;          7569          begin                      !THEN ERROR AND EXIT TESTED
;          7570          ERRDF (111, INTER, DUMPER);
;          7571          PRINTB (SEV_FMT, WRD_14, PHR_10, FNC_15, WRD_12, FNC_17, WRD_37, WRD_56);
;          7572          EXIT_TST;
;          7573          end;
;          7574
;          7575      end;
;          7576
;          7577  ARR_SEL = ZEROES;
;          7578  ARR_SEL = .ARR_SEL - .ARR_INC;     !START ARR SEL BACK ONE AGAIN
;          7579
;          7580  incr ARR_CNT from 0 to .OP_NUM_ARR do          !TEST ALL PRESENT ARRAYS
;          7581      begin
;          7582      BGNSUB;
;          7583      CLR_MBUS;
;          7584      FND_GD_NIB = ZERO;
;          7585      DAT_DM = ONE;                  !SET DATA DIAG MODE
;          7586      MLWC = not 255;                !LOAD WORD COUNT
;          7587      MLBA = IO_BUF;                 !LOAD UBUS ADDRESS
;          7588      ARR_SEL = .ARR_SEL + .ARR_INC; !LOOK AT NEXT ARRAY
;          7589      MLDA = .ARR_SEL;               !LOAD DSA WITH ARRAY SELECT
;          7590      MLCS1 = read;                  !DO A READ FUNCTION
;          7591
;          7592      do                             !THIS LOOP READS ARRAYS FOR ARRAY NUMBERS
;          7593          begin
;          7594          DELAY (ONE_US);
;          7595          PD_TEMP = .MLPD;           !GET THE PROM DATA
;          7596
;          7597          incr CNT from 0 to 8 do    !LOOK AT 9 NIBBLES
;          7598
;          7599              if .PD_TEMP [.CNT] IS_NOT_SET      !FIND THE GOOD NIBBLES WHERE ARR NUM IS STORED
;          7600              then
;          7601                  begin
;          7602                  DAT_CLK = ONE;     !CLOCK ARRAY WORD OUT
;          7603
;          7604                  case .CNT from 0 to 8 of       !SELECT AND READ GOOD NIBBLE
;          7605                      set
;          7606
;          7607                      [0] :
;          7608                          ARR_NUM = .(MLD1)<0, 4>;        !NIBBLE 0
;          7609
;          7610                      [1] :
;          7611                          ARR_NUM = .(MLD1)<4, 4>;        !NIBBLE 1
;          7612
;          7613                      [2] :
;          7614                          ARR_NUM = .(MLD1)<8, 4>;        !NIBBLE 2
```

```
16152 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
16153 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (82)
16154
16155 ;          7615
16156 ;          7616                        [3] :
16157 ;          7617                            ARR_NUM = .(MLD1)<12, 4>;       !NIBBLE 3
16158 ;          7618
16159 ;          7619                        [4] :
16160 ;          7620                            ARR_NUM = .(MLD2)<0, 4>;        !NIBBLE 4
16161 ;          7621
16162 ;          7622                        [5] :
16163 ;          7623                            ARR_NUM = .(MLD2)<4, 4>;        !NIBBLE 5
16164 ;          7624
16165 ;          7625                        [6] :
16166 ;          7626                            ARR_NUM = .(MLD2)<8, 4>;        !NIBBLE 6
16167 ;          7627
16168 ;          7628                        [7] :
16169 ;          7629                            ARR_NUM = .(MLD2)<12, 4>;       !NIBBLE 7
16170 ;          7630
16171 ;          7631                        [8] :
16172 ;          7632                            ARR_NUM = .(MLE2)<8, 4>;        !NIBBLE 8
16173 ;          7633                        tes;
16174 ;          7634
16175 ;          7635                    FND_GD_NIB = ONE;                   !SET FND GD NIB FLG
16176 ;          7636                    exitloop;                           !EXIT LOOP
16177 ;          7637                    end;
16178 ;          7638
16179 ;          7639                DAT_CLK = ONE;                          !CLOCK OUT NEXT PROM LOCATION
16180 ;          7640                end
16181 ;          7641            until .FND_GD_NIB IS_SET;                   !REPEAT UNTIL FOUND THE GOOD NIBBLE
16182 ;          7642
16183 ;          7643            if .ARR_CNT neq .ARR_NUM                    !SEE IF ARRAY CONTAINS IT'S ARR NUM
16184 ;          7644            then
16185 ;          7645                begin                                   !ERROR IF NOT THERE
16186 ;          7646                ERRDF (83, ASYNC, DUMPER);
16187 ;          7647                PRINTB (FOR_FMT, WRD_39, FNC_17, WRD_37, WRD_10);
16188 ;          7648                PRINTB (FMT_14, .ARR_CNT, .ARR_NUM);
16189 ;          7649                end;
16190 ;          7650
16191 ;          7651            ENDSUB;
16192 ;          7652            end;
16193 ;          7653
16194 ;          7654    ENDTST;
16198
16199                                        .SBTTL  $T32
16203 055760  004167  126132        $T32:   JSR     R1,$SAVE5                       ;                               7457
16204 055764  162706  000006                SUB     #6,SP
16205 055770  005005                        CLR     R5                              ; ARR.SEL                       7501
16206 055772  166705  133564                SUB     ARR.INC,R5                      ; *,ARR.SEL                     7502
```

```
                                        ;ML4                                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                                       14-May-1981 13:05:08    PA:<
16211 055776 016766 133556 000002       MOV     OP.NUM.ARR,2(SP)        ;                                                               7504
16212 056004 005003                     CLR     R3                      ; ARR.CNT
16213 056006 000167 000702              JMP     27$
16214 056012 152777 000040 135174 1$:   BISB    #40,@ML.REG+40          ;                                                               7505
16215 056020 016702 135556              MOV     ML.DUT,R2
16216 056024 042702 177770              BIC     #177770,R2
16217 056030 142777 000007 135156       BICB    #7,@ML.REG+40
16218 056036 150277 135152              BISB    R2,@ML.REG+40
16219 056042 005016                     CLR     (SP)                    ; FND.GD.NIB                                                    7507
16220 056044 005004                     CLR     R4                      ; WRDS.TSTED                                                    7508
16221 056046 152777 000010 135220       BISB    #10,@ML.REG+120         ;                                                               7509
16222 056054 012777 177400 135102       MOV     #-400,@ML.REG+10        ;                                                               7510
16223 056062 012777 011600 135104       MOV     #IO.BUF,@ML.REG+20      ;                                                               7511
16224 056070 066705 133466              ADD     ARR.INC,R5              ; *,ARR.SEL                                                     7512
16225 056074 010577 135104              MOV     R5,@ML.REG+30           ; ARR.SEL,*                                                     7513
16226 056100 012777 000061 135046       MOV     #61,@ML.REG             ;                                                               7514
16227 056106 012701 000001        2$:   MOV     #1,R1                   ; *,$$TMP2                                                      7518
16228 056112 001411               3$:   BEQ     6$
16229 056114 016702 123776              MOV     L$DLY,R2                ; *,$$TMP1
16230 056120 001404                     BEQ     5$
16231 056122 005066 000004        4$:   CLR     4(SP)                   ; $$TMP
16232 056126 005302                     DEC     R2                      ; $$TMP1
16233 056130 001374                     BNE     4$
16234 056132 005301               5$:   DEC     R1                      ; $$TMP2
16235 056134 000766                     BR      3$
16236 056136 017767 135242 134754 6$:   MOV     @ML.REG+230,PD.TEMP     ;                                                               7519
16237 056144 005204                     INC     R4                      ; WRDS.TSTED                                                    7520
16238 056146 005002                     CLR     R2                      ; CNT                                                           7522
16239 056150 010201               7$:   MOV     R2,R1                   ; CNT,*                                                         7524
16240 056152 006201                     ASR     R1
16241 056154 006201                     ASR     R1
16242 056156 006201                     ASR     R1
16243 056160 062701 013120              ADD     #PD.TEMP,R1
16244 056164 010146                     MOV     R1,-(SP)
16245 056166 010246                     MOV     R2,-(SP)                ; CNT,*
16246 056170 042716 177770              BIC     #177770,(SP)
16247 056174 012746 000001              MOV     #1,-(SP)
16248 056200 005046                     CLR     -(SP)
16249 056202 004767 124732              JSR     PC,BL$GT2
16250 056206 062706 000010              ADD     #10,SP
16251 056212 005700                     TST     R0
16252 056214 001155                     BNE     23$
16253 056216 010201                     MOV     R2,R1                   ; CNT,*                                                         7528
16254 056220 006301                     ASL     R1
16255 056222 066107 056226              ADD     8$(R1),PC
16256 056226 000022               8$:   .WORD   9$-8$
16257 056230 000040                     .WORD   10$-8$
16258 056232 000072                     .WORD   12$-8$
16259 056234 000112                     .WORD   13$-8$
16260 056236 000146                     .WORD   15$-8$
16261 056240 000164                     .WORD   16$-8$
16262 056242 000216                     .WORD   18$-8$
```

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                                                                                                14-May-1981 13:48:54    TOPS
                                                                                                14-May-1981 13:05:08    PA:<
16264                           ;ML4
16265                           ;
16266
16267 056244  000236                    .WORD   19$-8$
16268 056246  000272                    .WORD   21$-8$
16269 056250  010301            9$:     MOV     R3,R1                   ; ARR.CNT,*                             7532
16270 056252  042701  177760            BIC     #177760,R1
16271 056256  142777  000017  135060    BICB    #17,@ML.REG+170
16272 056264  000412                    BR      11$
16273 056266  010301            10$:    MOV     R3,R1                   ; ARR.CNT,*                             7535
16274 056270  006301                    ASL     R1
16275 056272  006301                    ASL     R1
16276 056274  006301                    ASL     R1
16277 056276  006301                    ASL     R1
16278 056300  042701  177417            BIC     #177417,R1
16279 056304  142777  000360  135032    BICB    #360,@ML.REG+170
16280 056312  150177  135026    11$:    BISB    R1,@ML.REG+170
16281 056316  000511                    BR      22$                     ;                                       7528
16282 056320  010301            12$:    MOV     R3,R1                   ; ARR.CNT,*                             7538
16283 056322  000301                    SWAB    R1
16284 056324  042701  170377            BIC     #170377,R1
16285 056330  042777  007400  135006    BIC     #7400,@ML.REG+170
16286 056336  000413                    BR      14$
16287 056340  010301            13$:    MOV     R3,R1                   ; ARR.CNT,*                             7541
16288 056342  000301                    SWAB    R1
16289 056344  006301                    ASL     R1
16290 056346  006301                    ASL     R1
16291 056350  006301                    ASL     R1
16292 056352  006301                    ASL     R1
16293 056354  042701  007777            BIC     #7777,R1
16294 056360  042777  170000  134756    BIC     #170000,@ML.REG+170
16295 056366  050177  134752    14$:    BIS     R1,@ML.REG+170
16296 056372  000463                    BR      22$                     ;                                       7528
16297 056374  010301            15$:    MOV     R3,R1                   ; ARR.CNT,*                             7544
16298 056376  042701  177760            BIC     #177760,R1
16299 056402  142777  000017  134744    BICB    #17,@ML.REG+200
16300 056410  000412                    BR      17$
16301 056412  010301            16$:    MOV     R3,R1                   ; ARR.CNT,*                             7547
16302 056414  006301                    ASL     R1
16303 056416  006301                    ASL     R1
16304 056420  006301                    ASL     R1
16305 056422  006301                    ASL     R1
16306 056424  042701  177417            BIC     #177417,R1
16307 056430  142777  000360  134716    BICB    #360,@ML.REG+200
16308 056436  150177  134712    17$:    BISB    R1,@ML.REG+200
16309 056442  000437                    BR      22$                     ;                                       7528
16310 056444  010301            18$:    MOV     R3,R1                   ; ARR.CNT,*                             7550
16311 056446  000301                    SWAB    R1
16312 056450  042701  170377            BIC     #170377,R1
16313 056454  042777  007400  134672    BIC     #7400,@ML.REG+200
16314 056462  000413                    BR      20$
16315 056464  010301            19$:    MOV     R3,R1                   ; ARR.CNT,*                             7553
16316 056466  000301                    SWAB    R1
16317 056470  006301                    ASL     R1
16318 056472  006301                    ASL     R1
```

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16320                          ;ML4                                                    14-May-1981 13:48:54    TOPS
16321                          ;                                                       14-May-1981 13:05:08    PA:<
16322
16323 056474  006301                    ASL     R1
16324 056476  006301                    ASL     R1
16325 056500  042701  007777            BIC     #7777,R1
16326 056504  042777  170000  134642    BIC     #170000,@ML.REG+200
16327 056512  050177  134636      20$:  BIS     R1,@ML.REG+200
16328 056516  000411                    BR      22$                     ;                       7528
16329 056520  010301              21$:  MOV     R3,R1                   ; ARR.CNT,*             7556
16330 056522  000301                    SWAB    R1
16331 056524  042701  170377            BIC     #170377,R1
16332 056530  042777  007400  134576    BIC     #7400,@ML.REG+160
16333 056536  050177  134572            BIS     R1,@ML.REG+160
16334 056542  012716  000001      22$:  MOV     #1,(SP)                 ; *,FND.GD.NIB          7559
16335 056546  000406                    BR      24$                     ;                       7560
16336 056550  005202              23$:  INC     R2                      ; CNT                   7522
16337 056552  020227  000010            CMP     R2,#10                  ; CNT,*
16338 056556  003002                    BGT     24$
16339 056560  000167  177364            JMP     7$
16340 056564  152777  000020  134502  24$:  BISB    #20,@ML.REG+120         ;                       7563
16341 056572  021627  000001            CMP     (SP),#1                 ; FND.GD.NIB,*          7565
16342 056576  001405                    BEQ     25$
16343 056600  020427  000016            CMP     R4,#16                  ; WRDS.TSTED,*
16344 056604  001402                    BEQ     25$
16345 056606  000167  177274            JMP     2$
16346 056612  020427  000016      25$:  CMP     R4,#16                  ; WRDS.TSTED,*          7567
16347 056616  001035                    BNE     26$
16348 056620  104455                    TRAP    55                      ;                       7570
16349 056622  000157                    .WORD   157
16350 056624  010672                    .WORD   INTER
16351 056626  024060                    .WORD   DUMPER
16352 056630  012746  007122            MOV     #WRD.56,-(SP)           ;                       7571
16353 056634  012746  006700            MOV     #WRD.37,-(SP)
16354 056640  012746  010162            MOV     #FNC.17,-(SP)
16355 056644  012746  006426            MOV     #WRD.12,-(SP)
16356 056650  012746  010136            MOV     #FNC.15,-(SP)
16357 056654  012746  007564            MOV     #PHR.10,-(SP)
16358 056660  012746  006442            MOV     #WRD.14,-(SP)
16359 056664  012746  006120            MOV     #SEV.FMT,-(SP)
16360 056670  012746  000010            MOV     #10,-(SP)
16361 056674  010600                    MOV     SP,R0                   ; SP,*
16362 056676  104414                    TRAP    14
16363 056700  104463                    TRAP    63
16364 056702  062706  000022            ADD     #22,SP                  ;                       7567
16365 056706  000167  000562            JMP     56$                     ;                       7569
16366 056712  005203              26$:  INC     R3                      ; ARR.CNT               7504
16367 056714  020366  000002      27$:  CMP     R3,2(SP)                ; ARR.CNT,*
16368 056720  003002                    BGT     28$
16369 056722  000167  177064            JMP     1$
16370 056726  005005              28$:  CLR     R5                      ; ARR.SEL               7577
16371 056730  166705  132626            SUB     ARR.INC,R5              ; *,ARR.SEL             7578
16372 056734  016766  132620  000002    MOV     OP.NUM.ARR,2(SP)        ;                       7580
16373 056742  005004                    CLR     R4                      ; ARR.CNT
16374 056744  000167  000516            JMP     55$
```

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16376                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
16377                                   ;                                                       14-May-1981 13:05:08    PA:<
16378
16379 056750  104402                    29$:    TRAP    2                       ;                                       7581
16380 056752  152777  000040  134234            BISB    #40,@ML.REG+40          ;                                       7582
16381 056760  016702  134616                    MOV     ML.DUT,R2
16382 056764  042702  177770                    BIC     #177770,R2
16383 056770  142777  000007  134216            BICB    #7,@ML.REG+40
16384 056776  150277  134212                    BISB    R2,@ML.REG+40
16385 057002  005016                            CLR     (SP)                    ; FND.GD.NIB                            7584
16386 057004  152777  000010  134262            BISB    #10,@ML.REG+120         ;                                       7585
16387 057012  012777  177400  134144            MOV     #-400,@ML.REG+10        ;                                       7586
16388 057020  012777  011600  134146            MOV     #IO.BUF,@ML.REG+20      ;                                       7587
16389 057026  066705  132530                    ADD     ARR.INC,R5              ; *,ARR.SEL                             7588
16390 057032  010577  134146                    MOV     R5,@ML.REG+30           ; ARR.SEL,*                             7589
16391 057036  012777  000071  134110            MOV     #71,@ML.REG             ;                                       7590
16392 057044  012701  000001          30$:      MOV     #1,R1                   ; *,$$TMP2                              7594
16393 057050  001411                  31$:      BEQ     34$
16394 057052  016702  123040                    MOV     L$DLY,R2                ; *,$$TMP1
16395 057056  001404                            BEQ     33$
16396 057060  005066  000004          32$:      CLR     4(SP)                   ; $$TMP
16397 057064  005302                            DEC     R2                      ; $$TMP1
16398 057066  001374                            BNE     32$
16399 057070  005301                  33$:      DEC     R1                      ; $$TMP2
16400 057072  000766                            BR      31$
16401 057074  017767  134304  134016  34$:      MOV     @ML.REG+230,PD.TEMP     ;                                       7595
16402 057102  005002                            CLR     R2                      ; CNT                                   7597
16403 057104  010201                  35$:      MOV     R2,R1                   ; CNT,*                                 7599
16404 057106  006201                            ASR     R1
16405 057110  006201                            ASR     R1
16406 057112  006201                            ASR     R1
16407 057114  062701  013120                    ADD     #PD.TEMP,R1
16408 057120  010146                            MOV     R1,-(SP)
16409 057122  010246                            MOV     R2,-(SP)                ; CNT,*
16410 057124  042716  177770                    BIC     #177770,(SP)
16411 057130  012746  000001                    MOV     #1,-(SP)
16412 057134  005046                            CLR     -(SP)
16413 057136  004767  123776                    JSR     PC,BL$GT2
16414 057142  062706  000010                    ADD     #10,SP
16415 057146  005700                            TST     R0
16416 057150  001070                            BNE     50$
16417 057152  152777  000020  134114            BISB    #20,@ML.REG+120         ;                                       7602
16418 057160  010201                            MOV     R2,R1                   ; CNT,*                                 7604
16419 057162  006301                            ASL     R1
16420 057164  066107  057170                    ADD     36$(R1),PC
16421 057170  000022                  36$:      .WORD   37$-36$
16422 057172  000030                            .WORD   38$-36$
16423 057174  000036                            .WORD   39$-36$
16424 057176  000044                            .WORD   40$-36$
16425 057200  000052                            .WORD   41$-36$
16426 057202  000060                            .WORD   42$-36$
16427 057204  000076                            .WORD   44$-36$
16428 057206  000104                            .WORD   45$-36$
16429 057210  000122                            .WORD   47$-36$
16430 057212  117703  134126          37$:      MOVB    @ML.REG+170,R3          ; *,ARR.NUM                             7608
```

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16432                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
16433                                   ;                                                       14-May-1981 13:05:08    PA:<
16434
16435 057216  000440                             BR      49$
16436 057220  117703  134120              38$:   MOVB    @ML.REG+170,R3          ; *,ARR.NUM                     7611
16437 057224  000413                             BR      43$
16438 057226  017703  134112              39$:   MOV     @ML.REG+170,R3          ; *,ARR.NUM                     7614
16439 057232  000431                             BR      48$
16440 057234  017703  134104              40$:   MOV     @ML.REG+170,R3          ; *,ARR.NUM                     7617
16441 057240  000417                             BR      46$
16442 057242  117703  134106              41$:   MOVB    @ML.REG+200,R3          ; *,ARR.NUM                     7620
16443 057246  000424                             BR      49$
16444 057250  117703  134100              42$:   MOVB    @ML.REG+200,R3          ; *,ARR.NUM                     7623
16445 057254  006203                      43$:   ASR     R3                      ; ARR.NUM
16446 057256  006203                             ASR     R3                      ; ARR.NUM
16447 057260  006203                             ASR     R3                      ; ARR.NUM
16448 057262  006203                             ASR     R3                      ; ARR.NUM
16449 057264  000415                             BR      49$
16450 057266  017703  134062              44$:   MOV     @ML.REG+200,R3          ; *,ARR.NUM                     7626
16451 057272  000411                             BR      48$
16452 057274  017703  134054              45$:   MOV     @ML.REG+200,R3          ; *,ARR.NUM                     7629
16453 057300  006203                      46$:   ASR     R3                      ; ARR.NUM
16454 057302  006203                             ASR     R3                      ; ARR.NUM
16455 057304  006203                             ASR     R3                      ; ARR.NUM
16456 057306  006203                             ASR     R3                      ; ARR.NUM
16457 057310  000402                             BR      48$
16458 057312  017703  134016              47$:   MOV     @ML.REG+160,R3          ; *,ARR.NUM                     7632
16459 057316  000303                      48$:   SWAB    R3                      ; ARR.NUM
16460 057320  042703  177760              49$:   BIC     #177760,R3              ; *,ARR.NUM
16461 057324  012716  000001                     MOV     #1,(SP)                 ; *,FND.GD.NIB                  7635
16462 057330  000404                             BR      51$                     ;                               7636
16463 057332  005202                      50$:   INC     R2                      ; CNT                           7597
16464 057334  020227  000010                     CMP     R2,#10                  ; CNT,*
16465 057340  003661                             BLE     35$
16466 057342  152777  000020  133724      51$:   BISB    #20,@ML.REG+120         ;                               7639
16467 057350  021627  000001                     CMP     (SP),#1                 ; FND.GD.NIB,*                  7641
16468 057354  001233                             BNE     30$
16469 057356  020403                             CMP     R4,R3                   ; ARR.CNT,ARR.NUM               7643
16470 057360  001434                             BEQ     52$
16471 057362  104455                             TRAP    55                      ;                               7646
16472 057364  000123                             .WORD   123
16473 057366  010464                             .WORD   ASYNC
16474 057370  024060                             .WORD   DUMPER
16475 057372  012746  006406                     MOV     #WRD.10,-(SP)           ;                               7647
16476 057376  012746  006700                     MOV     #WRD.37,-(SP)
16477 057402  012746  010162                     MOV     #FNC.17,-(SP)
16478 057406  012746  006716                     MOV     #WRD.39,-(SP)
16479 057412  012746  006046                     MOV     #FOR.FMT,-(SP)
16480 057416  012746  000005                     MOV     #5,-(SP)
16481 057422  010600                             MOV     SP,R0                   ; SP,*
16482 057424  104414                             TRAP    14
16483 057426  010316                             MOV     R3,(SP)                 ; ARR.NUM,*                     7648
16484 057430  010446                             MOV     R4,-(SP)                ; ARR.CNT,*
16485 057432  012746  005110                     MOV     #FMT.14,-(SP)
16486 057436  012746  000003                     MOV     #3,-(SP)
```

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16488                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
16489                                   ;                                                       14-May-1981 13:05:08    PA:<
16490
16491 057442  010600                              MOV     SP,R0                   ; SP,*
16492 057444  104414                              TRAP    14
16493 057446  062706  000022                      ADD     #22,SP                  ;                                       7645
16494 057452  104467                    52$:      TRAP    67                      ;                                       7649
16495 057454  006000                              ROR     R0
16496 057456  103002                              BHIS    54$
16497 057460  000167  177264              53$:      JMP     29$
16498 057464  005204                    54$:      INC     R4                      ; ARR.CNT                               7580
16499 057466  020466  000002              55$:      CMP     R4,2(SP)                ; ARR.CNT,*
16500 057472  003772                              BLE     53$
16501 057474  062706  000006              56$:      ADD     #6,SP                   ;                                       7457
16502 057500  000207                              RTS     PC
16503
16504                                   ; Routine Size:  425 words
16505                                   ; Maximum stack depth per invocation:  18 words
16510
16511
16515
16516                                             .SBTTL  T32
16520 057502                            T32::
16521 057502  004767  176252              1$:       JSR     PC,$T32                 ;                                       7652
16522 057506  104466                              TRAP    66
16523 057510  006000                              ROR     R0
16524 057512  103773                              BLO     1$
16525 057514  000207                              RTS     PC
16526
16527                                   ; Routine Size:  6 words
16528                                   ; Maximum stack depth per invocation:  0 words
16533
16534
16535 ;           7655  !<BLF/PAGE>
```

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16537 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
16538 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (83)
16539
16540 ;          7656  !
16541 ;          7657  BGNTST;
16542 ;          7658
16543 ;          7659  !++
16544 ;          7660  ! TEST NUMBER:  TST 33
16545 ;          7661  !
16546 ;          7662  ! TEST NAME:    SEQUENCER EXISTENCE TEST
16547 ;          7663  !
16548 ;          7664  ! TEST DESCRIPTION:
16549 ;          7665  !
16550 ;          7666  !       TEST SEQUENCER TIMING AND CONTROL
16551 ;          7667  !       LOGIC FOR EXISTENCE BY:
16552 ;          7668  !
16553 ;          7669  !       1.  FIRST WRITING THE GOOD BLOCK VIA DAT_DM MODE WITH A BACKGROUND
16554 ;          7670  !           PATTERN OF ONES.
16555 ;          7671  !
16556 ;          7672  !
16557 ;          7673  !       2.  VIA A MBUS WRITE FUNCTION WRITE ONES INTO THE GOOD BLOCK.
16558 ;          7674  !
16559 ;          7675  !       3.  THEN VIA DAT_DM READ GOOD NIBBLES IN THE GOOD BLOCK AND XOR THEM
16560 ;          7676  !           AGAINST THE BACKGROUND PATTERN.
16561 ;          7677  !
16562 ;          7678  !           RECORD THE NUMBER OF NIBBLES THAT WERE UNCHANGED OR PARTIALLY CHANGED
16563 ;          7679  !           BY THE MBUS WIRTE.
16564 ;          7680  !
16565 ;          7681  !       4.  REPORT A FATAL ERROR AND DROP THIS UNIT IF THE NIBBLES TESTED EQUALS
16566 ;          7682  !           THE COUNT OF UNCHANGED NIBBLES.
16567 ;          7683  !
16568 ;          7684  !           REPORT AN INTERMEDIATE DIAGNOSTIC MESSAGE IF AT LEAST SOME NIBBLES
16569 ;          7685  !           WERE CHANGED BY THE MBUS WRITE.
16570 ;          7686  !
16571 ;          7687  ! IMPLICIT INPUTS:
16572 ;          7688  !       PD_TEMP:
16573 ;          7689  !       A BIT VECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND ACCESSED FROM.
16574 ;          7690  !
16575 ;          7691  !       IO_BUF:
16576 ;          7692  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTIONS
16577 ;          7693  !       ARE FOUND.
16578 ;          7694  !--
16579 ;          7695
16580 ;          7696  local
16581 ;          7697      BG_PAT,                           !BACK GROUND PATTERN
16582 ;          7698      SUM_BAD,                          !SUM NIBBLE ARE BAD
16583 ;          7699      NIB_TSTED,                        !NIBBLES TESTED
16584 ;          7700      ALL_BAD,                          !ALL NIBBLES ARE BAD
16585 ;          7701      RESULT;                           !RESULTS OF XOR
16586 ;          7702
16587 ;          7703  CLR_MBUS;
16588 ;          7704  BG_PAT = ONES;                        !BACKGROUND EQL ONES
16589 ;          7705  MLD1 = .BG_PAT;                       !LOAD DATA DIAG REG WITH BG PAT
16590 ;          7706  MLD2 = .BG_PAT;
16591 ;          7707  MLE2 = .BG_PAT;
16592 ;ML4                                                   14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
16593 ;                                                      14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (83)
```

```
16594
16595 ;          7708  DAT_DM_XFER ();                          !SET UP A  DATA DIAG XFERR AT THE GOOD BLOCK
16596 ;          7709  MLCS1 = write;                           !DO A WRITE FUNCTION
16597 ;          7710
16598 ;          7711  incr WD_CNT from 0 to 127 do             !WRITE BLOCK WITH BG PAT
16599 ;          7712      begin
16600 ;          7713      DELAY (ONE_US);
16601 ;          7714      DAT_CLK = ONE;
16602 ;          7715      end;
16603 ;          7716
16604 ;          7717  CLR_MBUS;
16605 ;          7718  IO_BUF = ZEROES;                         !LOAD FIRST WORD OF IO_BUF
16606 ;          7719  BAI = ONE;                               !MAKE XFERR SET ON ONE ADRS
16607 ;          7720  GD_BLK_XFER ();                          !SET UP A GOOD BLOCK XFERR
16608 ;          7721  MLCS1 = write;                           !DO A WRITE FUNCTION
16609 ;          7722  TIME_OUT_LOOP;
16610 ;          7723  BGNSUB;
16611 ;          7724  CLR_MBUS;
16612 ;          7725  ALL_BAD = ZEROES;
16613 ;          7726  SUM_BAD = ZEROES;
16614 ;          7727  NIB_TSTED = ZEROES;
16615 ;          7728  DAT_DM_XFER ();                          !SET UP SAME DATA DIAG XFERR
16616 ;          7729  MLCS1 = read;                            !DO A READ FUNCTION
16617 ;          7730  DELAY (ONE_US);
16618 ;          7731
16619 ;          7732  incr WD_CNT from 0 to 112 do             !READ 113 LONG WORDS
16620 ;          7733      begin
16621 ;          7734      PD_TEMP = .MLPD;                     !GET PROM DATA
16622 ;          7735      DAT_CLK = ONE;                       !CLOCK OUT THE DATA WORD
16623 ;          7736      DELAY (ONE_US);
16624 ;          7737      RD_LNG_WRD;                          !READ THE DATA WORD
16625 ;          7738
16626 ;          7739      incr NIB_PTR from 0 to 8 do          !LOOK AT 9 NIBBLES
16627 ;          7740
16628 ;          7741          if .PD_TEMP [.NIB_PTR] eql ZERO  !FIND GOOD NIBBLE
16629 ;          7742          then
16630 ;          7743              begin
16631 ;          7744              NIB_TSTED = .NIB_TSTED + 1;  !INCREMENT COUNT OF NIBBLES TESTED
16632 ;          7745              XOR_LNG_WRD (.NIB_PTR, .BG_PAT, RESULT);    !XOR NIBBLE WITH BG PAT
16633 ;          7746
16634 ;          7747              if .RESULT<0, 4> eql ZERO    !SEE IF ALL BITS IN NIBBLE WERE BAD?
16635 ;          7748              then
16636 ;          7749                  ALL_BAD = .ALL_BAD + 1   !INCREMENT COUNT IF ALL BAD
16637 ;          7750              else
16638 ;          7751
16639 ;          7752                  if .RESULT<0, 4> neq %o'17' then SUM_BAD = .SUM_BAD + 1;
16640 ;          7753
16641 ;          7754                                           !SEE IF SOME BITS IN NIBBLE WERE BAD
16642 ;          7755              end;                         !INCREMENT COUNT IF SOME BAD
16643 ;          7756
16644 ;          7757      end;
16645 ;          7758
16646 ;          7759  ENDSUB;
16647 ;ML4                                                     14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
16648 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (83)
16649
16650 ;          7760
```

```
                        7761  if .NIB_TSTED eql .ALL_BAD                    !WHERE ALL NIBBLES XFERR'ED ALL BAD?
                        7762  then                                          !ERROR IF ALL BAD
                        7763      begin
                        7764      ERRDF (84, SYNC, DUMPER);
                        7765      PRINTB (SEV_FMT, WRD_22, PHR_4, WRD_9, WRD_12, WRD_23, FNC_5, WRD_19);
                        7766      DODU (.ML_LUN);
                        7767      DOCLN;
                        7768      end
                        7769  else
                        7770
                        7771      if .SUM_BAD gtr ZERO                      !SEE IF SEE NIBBLE WERE BAD?
                        7772      then
                        7773          begin                                 !SOME BAD IS OK SO GIVE INTERMEDIATE ERROR
                        7774          ERRDF (85, INTER, DUMPER);
                        7775          PRINTB (SIX_FMT, PHR_4, WRD_9, WRD_12, WRD_23, FNC_5, WRD_19);
                        7776          end;
                        7777
                        7778  ENDTST;
                                                .SBTTL  $T33
057516  004167  124374          $T33:   JSR     R1,$SAVE5                     ;                                       7654
057522  162706  000010                  SUB     #10,SP
057526  152777  000040  133460          BISB    #40,@ML.REG+40                ;                                       7701
057534  016705  134042                  MOV     ML.DUT,R5
057540  042705  177770                  BIC     #177770,R5
057544  142777  000007  133442          BICB    #7,@ML.REG+40
057552  150577  133436                  BISB    R5,@ML.REG+40
057556  012766  177777  000002          MOV     #-1,2(SP)                     ; *,BG.PAT                              7704
057564  012777  177777  133552          MOV     #-1,@ML.REG+170               ;                                       7705
057572  016677  000002  133554          MOV     2(SP),@ML.REG+200             ; BG.PAT,*                              7706
057600  016677  000002  133526          MOV     2(SP),@ML.REG+160             ; BG.PAT,*                              7707
057606  004767  134350                  JSR     PC,DAT.DM.XFER                ;                                       7708
057612  012777  000061  133334          MOV     #61,@ML.REG                   ;                                       7709
057620  005000                  1$:     CLR     R0                            ; WD.CNT                                7711
057622  012701  000001          2$:     MOV     #1,R1                         ; *,$$TMP2                              7713
057626  001411                          BEQ     5$
057630  016702  122262                  MOV     L$DLY,R2                      ; *,$$TMP1
057634  001404                          BEQ     4$
057636  005066  000006          3$:     CLR     6(SP)                         ; $$TMP
057642  005302                          DEC     R2                            ; $$TMP1
057644  001374                          BNE     3$
057646  005301                  4$:     DEC     R1                            ; $$TMP2
057650  000766                          BR      2$
057652  152777  000020  133414  5$:     BISB    #20,@ML.REG+120               ;                                       7714
057660  005200                          INC     R0                            ; WD.CNT                                7711
                        ;ML4                                                                  14-May-1981  13:48:54    TOPS
                        ;                                                                     14-May-1981  13:05:08    PA:<

057662  020027  000177                  CMP     R0,#177                       ; WD.CNT,*
057666  003755                          BLE     1$
057670  152777  000040  133316          BISB    #40,@ML.REG+40                ;                                       7715
057676  016705  133700                  MOV     ML.DUT,R5
057702  042705  177770                  BIC     #177770,R5
057706  142777  000007  133300          BICB    #7,@ML.REG+40
057714  150577  133274                  BISB    R5,@ML.REG+40
057720  005067  131654                  CLR     IO.BUF                        ;                                       7718
057724  152777  000010  133262          BISB    #10,@ML.REG+40                ;                                       7719
```

```
16714 057732 004767 136132                JSR     PC,GD.BLK.XFER          ;                                       7720
16715 057736 012777 000061 133210         MOV     #61,@ML.REG             ;                                       7721
16716 057744 105777 133254          6$:   TSTB    @ML.REG+50
16717 057750 100375                       BPL     6$
16718 057752 104402                 7$:   TRAP    2                       ;                                       7722
16719 057754 152777 000040 133232         BISB    #40,@ML.REG+40          ;                                       7723
16720 057762 016703 133614                MOV     ML.DUT,R3
16721 057766 042703 177770                BIC     #177770,R3
16722 057772 142777 000007 133214         BICB    #7,@ML.REG+40
16723 060000 150377 133210                BISB    R3,@ML.REG+40
16724 060004 005004                       CLR     R4                      ; ALL.BAD                               7725
16725 060006 005016                       CLR     (SP)                    ; SUM.BAD                               7726
16726 060010 005005                       CLR     R5                      ; NIB.TSTED                             7727
16727 060012 004767 134144                JSR     PC,DAT.DM.XFER          ;                                       7728
16728 060016 012777 000071 133130         MOV     #71,@ML.REG             ;                                       7729
16729 060024 012701 000001                MOV     #1,R1                   ; *,$$TMP2                              7730
16730 060030 001411                 8$:   BEQ     11$
16731 060032 016702 122060                MOV     L$DLY,R2                ; *,$$TMP1
16732 060036 001404                       BEQ     10$
16733 060040 005066 000006          9$:   CLR     6(SP)                   ; $$TMP
16734 060044 005302                       DEC     R2                      ; $$TMP1
16735 060046 001374                       BNE     9$
16736 060050 005301                 10$:  DEC     R1                      ; $$TMP2
16737 060052 000766                       BR      8$
16738 060054 005003                 11$:  CLR     R3                      ; WD.CNT                                7732
16739 060056 017767 133322 133034   12$:  MOV     @ML.REG+230,PD.TEMP     ;                                       7734
16740 060064 152777 000020 133202         BISB    #20,@ML.REG+120         ;                                       7735
16741 060072 012701 000001                MOV     #1,R1                   ; *,$$TMP2                              7736
16742 060076 001411                 13$:  BEQ     16$
16743 060100 016702 122012                MOV     L$DLY,R2                ; *,$$TMP1
16744 060104 001404                       BEQ     15$
16745 060106 005066 000006          14$:  CLR     6(SP)                   ; $$TMP
16746 060112 005302                       DEC     R2                      ; $$TMP1
16747 060114 001374                       BNE     14$
16748 060116 005301                 15$:  DEC     R1                      ; $$TMP2
16749 060120 000766                       BR      13$
16750 060122 017767 133216 131022   16$:  MOV     @ML.REG+170,D1.TEMP
16751 060130 017767 133220 131016         MOV     @ML.REG+200,D2.TEMP
16752 060136 017767 133172 131012         MOV     @ML.REG+160,E2.TEMP
16753 060144 005001                       CLR     R1                      ; NIB.PTR                               7739
16754 060146 010102                 17$:  MOV     R1,R2                   ; NIB.PTR,*                             7741
16755 060150 006202                       ASR     R2
16756 060152 006202                       ASR     R2
16757                               ;ML4                                                  14-May-1981 13:48:54    TOPS
16758                               ;                                                     14-May-1981 13:05:08    PA:<
16759
16760 060154 006202                       ASR     R2
16761 060156 062702 013120                ADD     #PD.TEMP,R2
16762 060162 010246                       MOV     R2,-(SP)
16763 060164 010146                       MOV     R1,-(SP)                ; NIB.PTR,*
16764 060166 042716 177770                BIC     #177770,(SP)
16765 060172 012746 000001                MOV     #1,-(SP)
16766 060176 005046                       CLR     -(SP)
16767 060200 004767 122734                JSR     PC,BL$GT2
16768 060204 062706 000010                ADD     #10,SP
16769 060210 005700                       TST     R0
16770 060212 001027                       BNE     20$
```

```
16771 060214 005205                    INC     R5                      ; NIB.TSTED                     7744
16772 060216 010146                    MOV     R1,-(SP)                ; NIB.PTR,*                     7745
16773 060220 016646 000004             MOV     4(SP),-(SP)             ; BG.PAT,*
16774 060224 012746 000012             MOV     #12,-(SP)
16775 060230 060616                    ADD     SP,(SP)                 ; RESULT,*
16776 060232 004767 136412             JSR     PC,XOR.LNG.WRD
16777 060236 016602 000012             MOV     12(SP),R2               ; RESULT,*                      7747
16778 060242 042702 177760             BIC     #177760,R2
16779 060246 001002                    BNE     18$
16780 060250 005204                    INC     R4                      ; ALL.BAD                       7749
16781 060252 000405                    BR      19$                     ;                               7747
16782 060254 020227 000017      18$:   CMP     R2,#17                  ;                               7752
16783 060260 001402                    BEQ     19$
16784 060262 005266 000006             INC     6(SP)                   ; SUM.BAD
16785 060266 062706 000006      19$:   ADD     #6,SP                   ;                               7743
16786 060272 005201             20$:   INC     R1                      ; NIB.PTR                       7739
16787 060274 020127 000010             CMP     R1,#10                  ; NIB.PTR,*
16788 060300 003722                    BLE     17$
16789 060302 005203                    INC     R3                      ; WD.CNT                        7732
16790 060304 020327 000160             CMP     R3,#160                 ; WD.CNT,*
16791 060310 003662                    BLE     12$
16792 060312 104467                    TRAP    67                      ;                               7757
16793 060314 006000                    ROR     R0
16794 060316 103615                    BLO     7$
16795 060320 020504                    CMP     R5,R4                   ; NIB.TSTED,ALL.BAD             7761
16796 060322 001037                    BNE     21$
16797 060324 104455                    TRAP    55                      ;                               7764
16798 060326 000124                    .WORD   124
16799 060330 010526                    .WORD   SYNC
16800 060332 024060                    .WORD   DUMPER
16801 060334 012746 006506             MOV     #WRD.19,-(SP)           ;                               7765
16802 060340 012746 007774             MOV     #FNC.5,-(SP)
16803 060344 012746 006544             MOV     #WRD.23,-(SP)
16804 060350 012746 006426             MOV     #WRD.12,-(SP)
16805 060354 012746 006374             MOV     #WRD.9,-(SP)
16806 060360 012746 007454             MOV     #PHR.4,-(SP)
16807 060364 012746 006530             MOV     #WRD.22,-(SP)
16808 060370 012746 006120             MOV     #SEV.FMT,-(SP)
16809 060374 012746 000010             MOV     #10,-(SP)
16810 060400 010600                    MOV     SP,R0                   ; SP,*
16811 060402 104414                    TRAP    14
16812                          ;ML4                                                  14-May-1981 13:48:54    TOPS
16813                          ;                                                     14-May-1981 13:05:08    PA:<
16814
16815 060404 016700 133170             MOV     ML.LUN,R0               ;                               7766
16816 060410 104451                    TRAP    51
16817 060412 104444                    TRAP    44
16818 060414 062706 000022             ADD     #22,SP                  ;                               7763
16819 060420 000432                    BR      22$                     ;                               7761
16820 060422 005716             21$:   TST     (SP)                    ; SUM.BAD                       7771
16821 060424 003430                    BLE     22$
16822 060426 104455                    TRAP    55                      ;                               7774
16823 060430 000125                    .WORD   125
16824 060432 010672                    .WORD   INTER
16825 060434 024060                    .WORD   DUMPER
16826 060436 012746 006506             MOV     #WRD.19,-(SP)           ;                               7775
16827 060442 012746 007774             MOV     #FNC.5,-(SP)
```

```
 16828 060446  012746  006544                  MOV     #WRD.23,-(SP)
 16829 060452  012746  006426                  MOV     #WRD.12,-(SP)
 16830 060456  012746  006374                  MOV     #WRD.9,-(SP)
 16831 060462  012746  007454                  MOV     #PHR.4,-(SP)
 16832 060466  012746  006100                  MOV     #SIX.FMT,-(SP)
 16833 060472  012746  000007                  MOV     #7,-(SP)
 16834 060476  010600                          MOV     SP,R0                           ; SP,*
 16835 060500  104414                          TRAP    14
 16836 060502  062706  000020                  ADD     #20,SP                          ;                       7773
 16837 060506  062706  000010          22$:    ADD     #10,SP                          ;                       7654
 16838 060512  000207                          RTS     PC
 16839
 16840                                 ; Routine Size:  255 words
 16841                                 ; Maximum stack depth per invocation:  19 words
 16846
 16847
 16851
 16852                                         .SBTTL  T33
 16856 060514                          T33::
 16857 060514  004767  176776          1$:     JSR     PC,$T33                         ;                       7776
 16858 060520  104466                          TRAP    66
 16859 060522  006000                          ROR     R0
 16860 060524  103773                          BLO     1$
 16861 060526  000207                          RTS     PC
 16862
 16863                                 ; Routine Size:  6 words
 16864                                 ; Maximum stack depth per invocation:  0 words
 16872
 16873
 16874 ;          7779  !<BLF/PAGE>
```

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16876 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
16877 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (84)
16878
16879 ;          7780  !
16880 ;          7781  !
16881 ;          7782  BGNTST;
16882 ;          7783
16883 ;          7784  !++
16884 ;          7785  ! TEST NUMBER:  TST 34
16885 ;          7786  !
16886 ;          7787  ! TEST NAME:    SYNC DATA BUS CONTINUITY TEST (WRITE PATH)
16887 ;          7788  !
16888 ;          7789  ! TEST DESCRIPTION:
16889 ;          7790  !
16890 ;          7791  !       TEST THE CONTINUITY OF THE
16891 ;          7792  !       SYNCHRONOUS MODULE WRITE PATH
16892 ;          7793  !       DATA BUS BY:
16893 ;          7794  !
16894 ;          7795  !       1.  VIA DAT_DM MODE WRITE A
16895 ;          7796  !           BACKGROUND PATTERN OF ONES
16896 ;          7797  !           INTO THE GOOD BLOCK.
16897 ;          7798  !
16898 ;          7799  !       2.  VIA MBUS WRITE FUNCTION
16899 ;          7800  !           WRITE A ZEROES PATTERN INTO
16900 ;          7801  !           THE GOOD BLOCK.
16901 ;          7802  !
16902 ;          7803  !       3.  VIA DAT_DM MODE READ GOOD
16903 ;          7804  !           NIBBLES IN THE GOOD BLOCK FOR
16904 ;          7805  !           ZEROES.
16905 ;          7806  !
16906 ;          7807  !       4.  REPEAT WITH COMPLIMENT
16907 ;          7808  !           DATA AND BACKGROUND PATTERNS.
16908 ;          7809  !
16909 ;          7810  ! IMPLICIT INPUTS:
16910 ;          7811  !
16911 ;          7812  !       PD_TEMP
16912 ;          7813  !
16913 ;          7814  !       A BIT VECTOR OF 16 BITS WHERE
16914 ;          7815  !       THE READ PROM DATA IS STORED
16915 ;          7816  !       AND ACCESSED FROM.
16916 ;          7817  !
16917 ;          7818  !       IO_BUF
16918 ;          7819  !
16919 ;          7820  !       A VECTOR OF 256 WORDS WHERE
16920 ;          7821  !       DATA FOR MBUS READS AND WRITE
16921 ;          7822  !       FUNCTION ARE FOUND.
16922 ;          7823  !
16923 ;          7824  !
16924 ;          7825  !--
16925 ;          7826
16926 ;          7827  local
16927 ;          7828      DODU_FLG,                    !DROP UNIT FLAG
16928 ;          7829      BG_PAT,                      !BACKGROUND PATTERN
16929 ;          7830      RESULT,                      !RESULTS FROM XOR
16930 ;          7831      TST_PAT;                     !TEST PATTERN
```

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16932 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
16933 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (84)
16934
16935 ;          7832
16936 ;          7833  DODU_FLG = ZERO;
16937 ;          7834  BG_PAT = ZEROES;                       !BG PAT EQL 0'S
16938 ;          7835  TST_PAT = ONES;                        !TST PAT EQL 1'S
16939 ;          7836
16940 ;          7837  incr TWICE from 0 to 1 do              !REPEAT LOOP TWICE
16941 ;          7838      begin
16942 ;          7839      BGNSUB;
16943 ;          7840      CLR_MBUS;
16944 ;          7841      MLDT = .BG_PAT;                    !LOAD DATA DIAG REG WITH BG PAT
16945 ;          7842      MLD2 = .BG_PAT;
16946 ;          7843      MLE2 = .BG_PAT;
16947 ;          7844      DAT_DM_XFER ();                    !SET UP A DATA DIAG XFERR AT THE GOOD BLK
16948 ;          7845      MLCS1 = write;                     !DO A WRITE FUNCTION
16949 ;          7846
16950 ;          7847      incr WD_CNT from 0 to 127 do       !LOAD BLOCK WITH BG PAT
16951 ;          7848          begin
16952 ;          7849          DELAY (ONE_US);
16953 ;          7850          DAT_CLK = ONE;
16954 ;          7851          end;
16955 ;          7852
16956 ;          7853      CLR_MBUS;
16957 ;          7854      BAI = ONE;                         !SET ON FIRST IO_BUF ADRS
16958 ;          7855      IO_BUF = .TST_PAT;                 !FIRST IO_BUF WORD EQL'S TST_PAT
16959 ;          7856      GD_BLK_XFER ();                    !SET UP A GOOD BLOCK XFERR
16960 ;          7857      MLCS1 = write;                     !DO A WRITE FUNCTION
16961 ;          7858      TIME_OUT_LOOP;
16962 ;          7859      CLR_MBUS;
16963 ;          7860      DAT_DM_XFER ();                    !SET UP A DATA DIAG XFERR AT SAME BLOCK
16964 ;          7861      MLCS1 = read;                      !DO A READ FUNCTION
16965 ;          7862      DELAY (ONE_US);
16966 ;          7863
16967 ;          7864      incr WD_CNT from 0 to 112 do       !READ 113 LONG WORDS
16968 ;          7865          begin
16969 ;          7866          PD_TEMP = .MLPD;               !GET THE PROM DATA
16970 ;          7867          DAT_CLK = ONE;                 !CLOCK OUT THE DATA WORD
16971 ;          7868          DELAY (ONE_US);
16972 ;          7869          RD_LNG_WRD;                    !READ THE DATA WORD
16973 ;          7870
16974 ;          7871          incr NIB_PTR from 0 to 8 do    !LOOK AT 9 NIBBLES
16975 ;          7872
16976 ;          7873              if .PD_TEMP [.NIB_PTR] IS_NOT_SET   !FIND GOOD NIBBLES
16977 ;          7874              then
16978 ;          7875                  begin
16979 ;          7876                  XOR_LNG_WRD (.NIB_PTR, .TST_PAT, RESULT);       !XOR NIBBLE DATA WITH TST_PAT
16980 ;          7877
16981 ;          7878                  if .RESULT<0, 4> neq ZERO       !SEE IF EQUAL
16982 ;          7879                  then
16983 ;          7880                      begin                       !ERROR IF NEQ
16984 ;          7881                      ERRDF (86, SYNC, DUMPER);
16985 ;          7882                      PRINTB (FIV_FMT, WRD_24, WRD_25, WRD_10, WRD_12, FNC_5);
16986 ;          7883                      PRINTB (FMT_5, .TST_PAT, .RESULT, .NIB_PTR);
```

```
 16988 ;ML4                                                          14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
 16989 ;                                                            14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (84)
 16990
 16991 ;          7884                    DODU_FLG = ONE;
 16992 ;          7885                    end
 16993 ;          7886
 16994 ;          7887                end
 16995 ;          7888
 16996 ;          7889            end;
 16997 ;          7890
 16998 ;          7891        ENDSUB;
 16999 ;          7892
 17000 ;          7893        if .DODU_FLG IS_SET                    !DROP THIS UNIT IF DODU IS_SET
 17001 ;          7894                                               !AND EXITS TEST
 17002 ;          7895        then
 17003 ;          7896            begin
 17004 ;          7897            DODU (.ML_LUN);
 17005 ;          7898            DOCLN;
 17006 ;          7899            end;
 17007 ;          7900
 17008 ;          7901        BG_PAT = not .BG_PAT;                  !COMPLIMENT BG_PAT
 17009 ;          7902        TST_PAT = not .TST_PAT;                !COMPLIMENT TST_PAT AND REPEAT
 17010 ;          7903        end;
 17011 ;          7904
 17012 ;          7905    ENDTST;
 17016
 17017                                       .SBTTL  $T34
 17021 060530  004167  123362          $T34: JSR     R1,$SAVE5                 ;                                    7778
 17022 060534  024646                        CMP     -(SP),-(SP)
 17023 060536  005046                        CLR     -(SP)                     ; DODU.FLG                         7833
 17024 060540  005001                        CLR     R1                        ; BG.PAT                           7834
 17025 060542  012702  177777                MOV     #-1,R2                    ; *,TST.PAT                        7835
 17026 060546  005046                        CLR     -(SP)                     ; TWICE                            7837
 17027 060550  104402                  1$:   TRAP    2                         ;                                  7838
 17028 060552  152777  000040  132434        BISB    #40,@ML.REG+40            ;                                  7839
 17029 060560  016705  133016                MOV     ML.DUT,R5
 17030 060564  042705  177770                BIC     #177770,R5
 17031 060570  142777  000007  132416        BICB    #7,@ML.REG+40
 17032 060576  150577  132412                BISB    R5,@ML.REG+40
 17033 060602  010177  132536                MOV     R1,@ML.REG+170            ; BG.PAT,*                         7841
 17034 060606  010177  132542                MOV     R1,@ML.REG+200            ; BG.PAT,*                         7842
 17035 060612  010177  132516                MOV     R1,@ML.REG+160            ; BG.PAT,*                         7843
 17036 060616  004767  133340                JSR     PC,DAT.DM.XFER            ;                                  7844
 17037 060622  012777  000061  132324        MOV     #61,@ML.REG               ;                                  7845
 17038 060630  005003                        CLR     R3                        ; WD.CNT                           7847
 17039 060632  012704  000001          2$:   MOV     #1,R4                     ; *,$$TMP2                         7849
 17040 060636  001411                  3$:   BEQ     6$
 17041 060640  016705  121252                MOV     L$DLY,R5                  ; *,$$TMP1
 17042 060644  001404                        BEQ     5$
```

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                                                                                    14-May-1981 13:48:54    TOPS
                                                                                    14-May-1981 13:05:08    PA:<
17044                          ;ML4
17045                          ;
17046
17047 060646 005066 000006     4$:    CLR     6(SP)                ; $$TMP
17048 060652 005305                   DEC     R5                   ; $$TMP1
17049 060654 001374                   BNE     4$
17050 060656 005304            5$:    DEC     R4                   ; $$TMP2
17051 060660 000766                   BR      3$
17052 060662 152777 000020 132404 6$:  BISB    #20,@ML.REG+120      ;                                  7850
17053 060670 005203                   INC     R3                   ; WD.CNT                           7847
17054 060672 020327 000177            CMP     R3,#177              ; WD.CNT,*
17055 060676 003755                   BLE     2$
17056 060700 152777 000040 132306     BISB    #40,@ML.REG+40       ;                                  7851
17057 060706 016705 132670            MOV     ML.DUT,R5
17058 060712 042705 177770            BIC     #177770,R5
17059 060716 142777 000007 132270     BICB    #7,@ML.REG+40
17060 060724 150577 132264            BISB    R5,@ML.REG+40
17061 060730 152777 000010 132256     BISB    #10,@ML.REG+40       ;                                  7854
17062 060736 010267 130636            MOV     R2,IO.BUF            ; TST.PAT,*                        7855
17063 060742 004767 135122            JSR     PC,GD.BLK.XFER       ;                                  7856
17064 060746 012777 000061 132200     MOV     #61,@ML.REG          ;                                  7857
17065 060754 105777 132244     7$:    TSTB    @ML.REG+50
17066 060760 100375                   BPL     7$
17067 060762 152777 000040 132224     BISB    #40,@ML.REG+40       ;                                  7858
17068 060770 016705 132606            MOV     ML.DUT,R5
17069 060774 042705 177770            BIC     #177770,R5
17070 061000 142777 000007 132206     BICB    #7,@ML.REG+40
17071 061006 150577 132202            BISB    R5,@ML.REG+40
17072 061012 004767 133144            JSR     PC,DAT.DM.XFER       ;                                  7860
17073 061016 012777 000071 132130     MOV     #71,@ML.REG          ;                                  7861
17074 061024 012704 000001            MOV     #1,R4                ; *,$$TMP2                         7862
17075 061030 001411            8$:    BEQ     11$
17076 061032 016705 121060            MOV     L$DLY,R5             ; *,$$TMP1
17077 061036 001404                   BEQ     10$
17078 061040 005066 000006     9$:    CLR     6(SP)                ; $$TMP
17079 061044 005305                   DEC     R5                   ; $$TMP1
17080 061046 001374                   BNE     9$
17081 061050 005304            10$:   DEC     R4                   ; $$TMP2
17082 061052 000766                   BR      8$
17083 061054 005003            11$:   CLR     R3                   ; WD.CNT                           7864
17084 061056 017767 132322 132034 12$: MOV     @ML.REG+230,PD.TEMP  ;                                  7866
17085 061064 152777 000020 132202     BISB    #20,@ML.REG+120      ;                                  7867
17086 061072 012704 000001            MOV     #1,R4                ; *,$$TMP2                         7868
17087 061076 001411            13$:   BEQ     16$
17088 061100 016705 121012            MOV     L$DLY,R5             ; *,$$TMP1
17089 061104 001404                   BEQ     15$
17090 061106 005066 000006     14$:   CLR     6(SP)                ; $$TMP
17091 061112 005305                   DEC     R5                   ; $$TMP1
17092 061114 001374                   BNE     14$
17093 061116 005304            15$:   DEC     R4                   ; $$TMP2
17094 061120 000766                   BR      13$
17095 061122 017767 132216 130022 16$: MOV     @ML.REG+170,D1.TEMP
17096 061130 017767 132220 130016     MOV     @ML.REG+200,D2.TEMP
17097 061136 017767 132172 130012     MOV     @ML.REG+160,E2.TEMP
17098 061144 005004                   CLR     R4                   ; NIB.PTR                          7871
```

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17100                           ;ML4                                                    14-May-1981 13:48:54    TOPS
17101                           ;                                                       14-May-1981 13:05:08    PA:<
17102
17103 061146  010405              17$:    MOV     R4,R5                   ; NIB.PTR,*                             7873
17104 061150  006205                      ASR     R5
17105 061152  006205                      ASR     R5
17106 061154  006205                      ASR     R5
17107 061156  062705  013120              ADD     #PD.TEMP,R5
17108 061162  010546                      MOV     R5,-(SP)
17109 061164  010446                      MOV     R4,-(SP)                ; NIB.PTR,*
17110 061166  042716  177770              BIC     #177770,(SP)
17111 061172  012746  000001              MOV     #1,-(SP)
17112 061176  005046                      CLR     -(SP)
17113 061200  004767  121734              JSR     PC,BL$GT2
17114 061204  062706  000010              ADD     #10,SP
17115 061210  005700                      TST     R0
17116 061212  001060                      BNE     19$
17117 061214  010446                      MOV     R4,-(SP)                ; NIB.PTR,*                             7876
17118 061216  010246                      MOV     R2,-(SP)                ; TST.PAT,*
17119 061220  012746  000012              MOV     #12,-(SP)
17120 061224  060616                      ADD     SP,(SP)                 ; RESULT,*
17121 061226  004767  135416              JSR     PC,XOR.LNG.WRD
17122 061232  032766  000017  000012      BIT     #17,12(SP)              ; *,RESULT                              7878
17123 061240  001443                      BEQ     18$
17124 061242  104455                      TRAP    55                      ;                                       7881
17125 061244  000126                      .WORD   126
17126 061246  010526                      .WORD   SYNC
17127 061250  024060                      .WORD   DUMPER
17128 061252  012746  007774              MOV     #FNC.5,-(SP)            ;                                       7882
17129 061256  012746  006426              MOV     #WRD.12,-(SP)
17130 061262  012746  006406              MOV     #WRD.10,-(SP)
17131 061266  012746  006560              MOV     #WRD.25,-(SP)
17132 061272  012746  006552              MOV     #WRD.24,-(SP)
17133 061276  012746  006062              MOV     #FIV.FMT,-(SP)
17134 061302  012746  000006              MOV     #6,-(SP)
17135 061306  010600                      MOV     SP,R0                   ; SP,*
17136 061310  104414                      TRAP    14
17137 061312  010416                      MOV     R4,(SP)                 ; NIB.PTR,*                             7883
17138 061314  016646  000030              MOV     30(SP),-(SP)            ; RESULT,*
17139 061320  010246                      MOV     R2,-(SP)                ; TST.PAT,*
17140 061322  012746  004430              MOV     #FMT.5,-(SP)
17141 061326  012746  000004              MOV     #4,-(SP)
17142 061332  010600                      MOV     SP,R0                   ; SP,*
17143 061334  104414                      TRAP    14
17144 061336  012766  000001  000036      MOV     #1,36(SP)               ; *,DODU.FLG                            7884
17145 061344  062706  000026              ADD     #26,SP                  ;                                       7830
17146 061350  062706  000006      18$:    ADD     #6,SP                   ;                                       7875
17147 061354  005204              19$:    INC     R4                      ; NIB.PTR                               7871
17148 061356  020427  000010              CMP     R4,#10                  ; NIB.PTR,*
17149 061362  003671                      BLE     17$
17150 061364  005203                      INC     R3                      ; WD.CNT                                7864
17151 061366  020327  000160              CMP     R3,#160                 ; WD.CNT,*
17152 061372  003631                      BLE     12$
17153 061374  104467                      TRAP    67                      ;                                       7889
17154 061376  006000                      ROR     R0
```

```
                                                                                    14-May-1981 13:48:54    TOPS
                                                                                    14-May-1981 13:05:08    PA:<
                        ;ML4
                        ;
                                BHIS    21$
                20$:            JMP     1$
000001          21$:            CMP     2(SP),#1                ; DODU.FLG,*                            7893
                                BNE     22$
                                MOV     ML.LUN,R0               ;                                       7897
                                TRAP    51
                                TRAP    44
                22$:            COM     R1                      ; BG.PAT                                7901
                                COM     R2                      ; TST.PAT                               7902
                                INC     (SP)                    ; TWICE                                 7837
                                CMP     (SP),#1                 ; TWICE,*
                                BLE     20$
                                ADD     #10,SP                  ;                                       7778
                                RTS     PC

                        ; Routine Size:  232 words
                        ; Maximum stack depth per invocation:  24 words


                                .SBTTL  T34
                T34::
                1$:             JSR     PC,$T34                 ;                                       7903
                                TRAP    66
                                ROR     R0
                                BLO     1$
                                RTS     PC

                        ; Routine Size:  6 words
                        ; Maximum stack depth per invocation:  0 words


;               7906    !<BLF/PAGE>
```

```
17207 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
17208 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (85)
17209
17210 ;          7907  !
17211 ;          7908  BGNTST;
17212 ;          7909
17213 ;          7910  !++
17214 ;          7911  ! TEST NUMBER:  TST 35
17215 ;          7912  !
17216 ;          7913  ! TEST NAME:    SYNC DATA BUS CONIINUITY /READ PATH
17217 ;          7914  !
17218 ;          7915  ! TEST DESCRIPTION:
17219 ;          7916  !       TEST THE CONITNUITY OF THE SYNCHRONOUS MODULE READ
17220 ;          7917  !       DATA BUS BY:
17221 ;          7918  !
17222 ;          7919  !       1.  VIA MBUS WRITE FUNCTION WRITE ONES INTO THE GOOD BLOCK.
17223 ;          7920  !
17224 ;          7921  !       2.  VIA MBUS READ FUNCTION READ THE GOOD BLOCK FOR ONES.
17225 ;          7922  !
17226 ;          7923  !       3.  REPEAT WITH COMPLIMENT DATA PATTERN.
17227 ;          7924  !
17228 ;          7925  ! IMPLICIT INPUTS:
17229 ;          7926  !       IO_BUF
17230 ;          7927  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
17231 ;          7928  !       FUNCTION ARE FOUND.
17232 ;          7929  !--
17233 ;          7930
17234 ;          7931  local
17235 ;          7932      DODU_FLG,                                   !DROP UNIT FLAG
17236 ;          7933      TST_PAT,                                    !TEST PATTERN
17237 ;          7934      BG_PAT;                                     !BACKGROUND PATTERN
17238 ;          7935
17239 ;          7936  DODU_FLG = ZERO;
17240 ;          7937  TST_PAT = ONES;
17241 ;          7938  BG_PAT = ZEROES;
17242 ;          7939
17243 ;          7940  incr TWICE from 0 to 1 do                     !REPEAT LOOP TWICE
17244 ;          7941      begin
17245 ;          7942      CLR_MBUS;
17246 ;          7943      BAI = ONE;                                  !SET ON FIRST IO_BUF ADRS
17247 ;          7944      IO_BUF = .TST_PAT;                          !FIRST IO_BUF ADRS GET TST PAT
17248 ;          7945      GD_BLK_XFER ();                             !SET UP A GOOD BLOCK XFERR
17249 ;          7946      MLCS1 = write;                              !DO A WRITE FUNCTION (WRITES THE TST_PAT)
17250 ;          7947      TIME_OUT_LOOP;
17251 ;          7948      BGNSUB;
17252 ;          7949      CLR_MBUS;
17253 ;          7950
17254 ;          7951      incr IO_CNT from 0 to 255 do                !LOAD IO_BUF WITH BG PAT
17255 ;          7952          IO_BUF [.IO_CNT] = .BG_PAT;
17256 ;          7953
17257 ;          7954      GD_BLK_XFER ();                             !SET UP A GOOD BLOCK XFERR
17258 ;          7955      MLCS1 = read;                               !DO A READ FUNCTION (READ THE TST PAT)
17259 ;          7956      TIME_OUT_LOOP;
17260 ;          7957
17261 ;          7958      incr IO_CNT from 0 to 255 do                !READ THE IO_BUF FOR TEST PATTERN
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (85)

                7959
                7960            if .IO_BUF [.IO_CNT] neq .TST_PAT       !SEE IF IO_BUF WORD EQLS TST PAT
                7961            then
                7962                begin                               !ERROR AND SET DODU_FLG IF NEQ
                7963                ERRDF (87, SYNC, DUMPER);
                7964                PRINTB (SEV_FMT, WRD_24, WRD_25, WRD_10, WRD_12, WRD_23, FNC_6, WRD_19);
                7965                PRINTB (FMT_2, .TST_PAT, .IO_BUF [.IO_CNT], ~.TST_PAT xor .IO_BUF [.IO_CNT]));
                7966                DODU_FLG = ONE;
                7967                end;
                7968
                7969        ENDSUB;
                7970
                7971        if .DODU_FLG IS_SET                     !DROP THIS UNIT IF DODU_FLG IS SET
                7972        then
                7973            begin
                7974            DODU (.ML_LUN);
                7975            DOCLN;
                7976            end;
                7977
                7978        TST_PAT = not .TST_PAT;                 !COMPLIMENT TST_PAT
                7979        BG_PAT = not .BG_PAT;                   !COMPLIMENT BG_PAT AND REPEAT
                7980        end;
                7981
                7982    ENDTST;
17293
17294                                   .SBTTL  $T35
17298 061464 004167 122426      $T35:   JSR     R1,$SAVE5               ;                                       7905
17299 061470 005046                     CLR     -(SP)                   ; DODU.FLG                              7936
17300 061472 012701 177777              MOV     #-1,R1                  ; *,TST.PAT                             7937
17301 061476 005004                     CLR     R4                      ; BG.PAT                                7938
17302 061500 005005                     CLR     R5                      ; TWICE                                 7940
17303 061502 152777 000040 131504 1$:   BISB    #40,@ML.REG+40          ;                                       7941
17304 061510 016703 132066              MOV     ML.DUT,R3
17305 061514 042703 177770              BIC     #177770,R3
17306 061520 142777 000007 131466       BICB    #7,@ML.REG+40
17307 061526 150377 131462              BISB    R3,@ML.REG+40
17308 061532 152777 000010 131454       BISB    #10,@ML.REG+40          ;                                       7943
17309 061540 010167 130034              MOV     R1,IO.BUF               ; TST.PAT,*                             7944
17310 061544 004767 134320              JSR     PC,GD.BLK.XFER          ;                                       7945
17311 061550 012777 000061 131376       MOV     #61,@ML.REG             ;                                       7946
17312 061556 105777 131442      2$:     TSTB    @ML.REG+50
17313 061562 100375                     BPL     2$
17314 061564 104402              3$:    TRAP    2                       ;                                       7947
17315 061566 152777 000040 131420       BISB    #40,@ML.REG+40          ;                                       7948
17316 061574 016703 132002              MOV     ML.DUT,R3
17317 061600 042703 177770              BIC     #177770,R3
```

```
17319                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
17320                                   ;                                                       14-May-1981 13:05:08    PA:<
17321
17322 061604  142777  000007  131402            BICB    #7,@ML.REG+40
17323 061612  150377  131376                    BISB    R3,@ML.REG+40
17324 061616  005002                            CLR     R2                          ; IO.CNT                            7951
17325 061620  010203                    4$:     MOV     R2,R3                       ; IO.CNT,*                          7952
17326 061622  006303                            ASL     R3
17327 061624  010463  011600                    MOV     R4,IO.BUF(R3)               ; BG.PAT,*
17328 061630  005202                            INC     R2                          ; IO.CNT                            7951
17329 061632  020227  000377                    CMP     R2,#377                     ; IO.CNT,*
17330 061636  003770                            BLE     4$
17331 061640  004767  134224                    JSR     PC,GD.BLK.XFER              ;                                   7954
17332 061644  012777  000071  131302            MOV     #71,@ML.REG                 ;                                   7955
17333 061652  105777  131346            5$:     TSTB    @ML.REG+50
17334 061656  100375                            BPL     5$
17335 061660  005002                            CLR     R2                          ; IO.CNT                            7958
17336 061662  010203                    6$:     MOV     R2,R3                       ; IO.CNT,*                          7960
17337 061664  006303                            ASL     R3
17338 061666  062703  011600                    ADD     #IO.BUF,R3
17339 061672  021301                            CMP     (R3),R1                     ; *,TST.PAT
17340 061674  001454                            BEQ     7$
17341 061676  104455                            TRAP    55                          ;                                   7963
17342 061700  000127                            .WORD   127
17343 061702  010526                            .WORD   SYNC
17344 061704  024060                            .WORD   DUMPER
17345 061706  012746  006506                    MOV     #WRD.19,-(SP)               ;                                   7964
17346 061712  012746  010004                    MOV     #FNC.6,-(SP)
17347 061716  012746  006544                    MOV     #WRD.23,-(SP)
17348 061722  012746  006426                    MOV     #WRD.12,-(SP)
17349 061726  012746  006406                    MOV     #WRD.10,-(SP)
17350 061732  012746  006560                    MOV     #WRD.25,-(SP)
17351 061736  012746  006552                    MOV     #WRD.24,-(SP)
17352 061742  012746  006120                    MOV     #SEV.FMT,-(SP)
17353 061746  012746  000010                    MOV     #10,-(SP)
17354 061752  010600                            MOV     SP,R0                       ; SP,*
17355 061754  104414                            TRAP    14
17356 061756  011316                            MOV     (R3),(SP)                   ;                                   7965
17357 061760  010146                            MOV     R1,-(SP)                    ; TST.PAT,*
17358 061762  046616  000002                    BIC     2(SP),(SP)
17359 061766  040166  000002                    BIC     R1,2(SP)                    ; TST.PAT,*
17360 061772  052616                            BIS     (SP)+,(SP)
17361 061774  011346                            MOV     (R3),-(SP)
17362 061776  010146                            MOV     R1,-(SP)                    ; TST.PAT,*
17363 062000  012746  004266                    MOV     #FMT.2,-(SP)
17364 062004  012746  000004                    MOV     #4,-(SP)
17365 062010  010600                            MOV     SP,R0                       ; SP,*
17366 062012  104414                            TRAP    14
17367 062014  012766  000001  000032            MOV     #1,32(SP)                   ; *,DODU.FLG                        7966
17368 062022  062706  000032                    ADD     #32,SP                      ;                                   7962
17369 062026  005202                    7$:     INC     R2                          ; IO.CNT                            7958
17370 062030  020227  000377                    CMP     R2,#377                     ; IO.CNT,*
17371 062034  003712                            BLE     6$
17372 062036  104467                            TRAP    67                          ;                                   7967
17373 062040  006000                            ROR     R0
```

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17375                           ;ML4                                                    14-May-1981 13:48:54    TOPS
17376                           ;                                                       14-May-1981 13:05:08    PA:<
17377
17378 062042  103650                    BLO     3$
17379 062044  021627  000001            CMP     (SP),#1                 ; DODU.FLG,*                    7971
17380 062050  001004                    BNE     8$
17381 062052  016700  131522            MOV     ML.LUN,R0               ;                               7974
17382 062056  104451                    TRAP    51
17383 062060  104444                    TRAP    44
17384 062062  005101            8$:     COM     R1                      ; TST.PAT                       7978
17385 062064  005104                    COM     R4                      ; BG.PAT                        7979
17386 062066  005205                    INC     R5                      ; TWICE                         7940
17387 062070  020527  000001            CMP     R5,#1                   ; TWICE,*
17388 062074  003602                    BLE     1$
17389 062076  005726                    TST     (SP)+                   ;                               7905
17390 062100  000207                    RTS     PC
17391
17392                           ; Routine Size:  135 words
17393                           ; Maximum stack depth per invocation:  20 words
17398
17399
17403
17404                                   .SBTTL  T35
17408 062102                    T35::
17409 062102  004767  177356    1$:     JSR     PC,$T35                 ;                               7980
17410 062106  104466                    TRAP    66
17411 062110  006000                    ROR     R0
17412 062112  103773                    BLO     1$
17413 062114  000207                    RTS     PC
17414
17415                           ; Routine Size:  6 words
17416                           ; Maximum stack depth per invocation:  0 words
17421
17422
17423 ;         7983  !<BLF/PAGE>
```

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14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (86)

```
17425 ;ML4
17426 :
17427
17428 :          7984  !
17429 :          7985  !
17430 :          7986  BGNTST;
17431 :          7987
17432 :          7988  !++
17433 :          7989  ! TEST NUMBER:  TST 36
17434 :          7990  !
17435 :          7991  ! TEST NAME:    RAM BUS ADRS COUNTER TEST /WRITE PATH
17436 :          7992  !
17437 :          7993  ! TEST DESCRIPTION:
17438 :          7994  !
17439 :          7995  !       TEST ABILITY OF THE RAM_BUS ADDRESS
17440 :          7996  !       COUNTERS TO LOAD/UNLOAD THE SKIP
17441 :          7997  !       RAM DURING WRITE FUNCTIONS BY:
17442 :          7998  !
17443 :          7999  !       1.  LOADING A REPEATING COUNT OF 0
17444 :          8000  !           TO 63 INTO THE NIBBLES OF THE
17445 :          8001  !           FIRST 64 WORDS OF THE IO_BUF.
17446 :          8002  !
17447 :          8003  !       2.  VIA MBUS WRITE FUNCTION WRITE
17448 :          8004  !           THE CONTENTS OF THE IO_BUF
17449 :          8005  !           INTO THE GOOD BLOCK.
17450 :          8006  !
17451 :          8007  !       3.  VIA DAT_DM READ GOOD NIBBLES IN
17452 :          8008  !           THE GOOD BLOCK FOR THE UNBROKEN
17453 :          8009  !           COUNT OF 0 TO 63.
17454 :          8010  !
17455 :          8011  !           ONCE A BAD NIBBLE IS ENCOUNTERED
17456 :          8012  !           MASK THAT NIBBLE FROM FURTHER
17457 :          8013  !           READS.
17458 :          8014  !
17459 :          8015  !       4.  REPEAT READING NIBBLES UNTIL
17460 :          8016  !           113 WORDS ARE READ OR ALL 10 NIBBLES
17461 :          8017  !           ARE MASKED.
17462 :          8018  !
17463 :          8019  ! IMPLICIT INPUTS:
17464 :          8020  !
17465 :          8021  !       PD_TEMP
17466 :          8022  !
17467 :          8023  !       A BIT VECTOR OF 16 BITS WHERE
17468 :          8024  !       THE READ PROM DATA IS STORED
17469 :          8025  !       AND ACCESSED FROM.
17470 :          8026  !
17471 :          8027  !       IO_BUF
17472 :          8028  !       A VECTOR OF 256 WORDS WHERE
17473 :          8029  !       DATA FOR MBUS READS AND WRITE
17474 :          8030  !       FUNCTION ARE FOUND.
17475 :          8031  !
17476 :          8032  !--
17477 :          8033
17478 :          8034  local
17479 :          8035      DODU_FLG,                                   !DROP UNIT FLAG
```

```
17481 ;ML4                                                          14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
17482 ;                                                             14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (86)
17483 ;
17484 ;         8036      WRD_CNT,                                  !WORD COUNT
17485 ;         8037      NIB_IGNORE : bitvector [16],              !NIBBLE IGNORE FLAGS
17486 ;         8038      ERR_FLG,                                  !ERROR FLAG
17487 ;         8039      BAD_NIB_CNT,                              !BAD NIBBLE COUNT
17488 ;         8040      PASS_CNT,                                 !PASS COUNT
17489 ;         8041      NIB_PAT;                                  !NIBBLE PATTERN
17490 ;         8042
17491 ;         8043  DODU_FLG = ZERO;
17492 ;         8044  WRD_CNT = ZERO;
17493 ;         8045
17494 ;         8046  incr CNT from 0 to 63 do                      !LOAD 64 WORDS WITH REPEATING COUNTS OF 0-63
17495 ;         8047
17496 ;         8048      incr PAT_CNT from -1 to 11 by 4 do      !LOAD NIBBLES IN WORD WITH REPEATING COUNTS OF 0-63
17497 ;         8049          begin
17498 ;         8050          (IO_BUF [.WRD_CNT])<0, 4> = .PAT_CNT + 1;       !LOAD FIRST NIBBLE IN WORD
17499 ;         8051          (IO_BUF [.WRD_CNT])<4, 4> = .PAT_CNT + 2;       !LOAD SECOND NIBBLE IN WORD
17500 ;         8052          (IO_BUF [.WRD_CNT])<8, 4> = .PAT_CNT + 3;       !LOAD THIRD NIBBLE IN WORD
17501 ;         8053          (IO_BUF [.WRD_CNT])<12, 4> = .PAT_CNT + 4;      !LOAD FORTH NIBBLE IN WORD
17502 ;         8054          WRD_CNT = .WRD_CNT + 1;                 !INCREMENT TO NEXT WORD
17503 ;         8055          end;
17504 ;         8056
17505 ;         8057  BGNSUB;
17506 ;         8058  CLR_MBUS;
17507 ;         8059  GD_BLK_XFER ();                               !SET UP A GOOD BLOCK XFERR
17508 ;         8060  MLCS1 = write;                                !DO A WRITE FUNCTION
17509 ;         8061  TIME_OUT_LOOP;
17510 ;         8062  CLR_MBUS;
17511 ;         8063  NIB_IGNORE = ZEROES;
17512 ;         8064  PASS_CNT = ZEROES;
17513 ;         8065  NIB_PAT = ZEROES;
17514 ;         8066  BAD_NIB_CNT = ZEROES;
17515 ;         8067  DAT_DM_XFER ();                               !SET UP A DATA DIAG MODE AT THE GOOD BLOCK
17516 ;         8068  MLCS1 = read;                                 !DO A READ FUNCTION
17517 ;         8069  DELAY (ONE_US);
17518 ;         8070
17519 ;         8071  do                                            !LOOP UNTIL THE BLOCK IS READ OR 9 BAD NIBBLES FOUND
17520 ;         8072      begin
17521 ;         8073      PD_TEMP = .MLPD;                          !GET THE PROM DATA
17522 ;         8074      DAT_CLK = ONE;                            !CLOCK OUT THE DATA WORD
17523 ;         8075      DELAY (ONE_US);
17524 ;         8076      RD_LNG_WRD;                               !READ THE DATA DIAG REGISTERS
17525 ;         8077
17526 ;         8078      incr NIB_PTR from 0 to 8 do               !LOOK AT 9 NIBBLES
17527 ;         8079          begin
17528 ;         8080
17529 ;         8081          if .PD_TEMP [.NIB_PTR] IS_NOT_SET     !FIND GOOD NIBBLES
17530 ;         8082          then
17531 ;         8083              begin
17532 ;         8084
17533 ;         8085              if .NIB_IGNORE [.NIB_PTR] IS_NOT_SET      !SEE IF THIS NIBBLE FOUND BAD BEFORE
17534 ;         8086              then
17535 ;         8087                  begin
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (86)

;          8088                TST_LNG_WRD (.NIB_PTR, .NIB_PAT, ERR_FLG);      !TEST THE NIBBLE IF NEVER FOUND BAD
;          8089
;          8090                if .ERR_FLG IS_SET                              !SEE IF TEST FOUND AN ERROR
;          8091                then
;          8092                    begin                                       !ERROR AND SET DODU_FLG IS SET
;          8093                    ERRDF (88, ARR_DAT, DUMPER);
;          8094                    PRINTB (SIX_FMT, FNC_18, WRD_50, WRD_10, WRD_12, FNC_5, WRD_19);
;          8095                    DODU_FLG = ONE;
;          8096                    end
;          8097
;          8098                end
;          8099
;          8100            end
;          8101        else                                                    !THIS NIBBLE IS BAD
;          8102            begin
;          8103            NIB_IGNORE [.NIB_PTR] = ONE;                        !SET THIS NIBBLE NIB_IGNORE FLAG
;          8104            BAD_NIB_CNT = .BAD_NIB_CNT + 1;                     !INCREMENT BAD NIB COUNT
;          8105            end;
;          8106
;          8107        NIB_PAT = .NIB_PAT + 1;                                 !INCREMENT NIB PAT
;          8108        end;
;          8109
;          8110    PASS_CNT = .PASS_CNT + 1;                                   !INCREMENT PASS COUNT
;          8111    end
;          8112until (.PASS_CNT eql 113) or (.BAD_NIB_CNT eql 9);            !REPEAT UNTIL COMPLETE
;          8113
;          8114ENDSUB;
;          8115
;          8116if .DODU_FLG IS_SET                                           !DROP THIS UNIT IF DODU_FLG SET
;          8117then
;          8118    begin
;          8119    DODU (.ML_LUN);
;          8120    DOCLN;
;          8121    end;
;          8122
;          8123ENDTST;
17579
17580                                       .SBTTL  $T36
17584 062116  004167  121774        $T36:   JSR     R1,$SAVE5                   ;                                   7982
17585 062122  162706  000006                SUB     #6,SP
17586 062126  005046                        CLR     -(SP)                       ; DODU.FLG                          8043
17587 062130  005003                        CLR     R3                          ; WRD.CNT                           8044
17588 062132  005002                        CLR     R2                          ; CNT                               8046
17589 062134  012700  177777        1$:     MOV     #-1,R0                      ; *,PAT.CNT                         8048
17590 062140  010301                2$:     MOV     R3,R1                       ; WRD.CNT,*                         8050
17591 062142  006301                        ASL     R1
```

```
17593                                   ;ML4
17594                                   ;
17595
17596 062144  062701  011600                      ADD     #IO.BUF,R1
17597 062150  010005                              MOV     R0,R5           ; PAT.CNT,*
17598 062152  005205                              INC     R5
17599 062154  042705  177760                      BIC     #177760,R5
17600 062160  142711  000017                      BICB    #17,(R1)
17601 062164  150511                              BISB    R5,(R1)
17602 062166  010005                              MOV     R0,R5           ; PAT.CNT,*             8051
17603 062170  062705  000002                      ADD     #2,R5
17604 062174  006305                              ASL     R5
17605 062176  006305                              ASL     R5
17606 062200  006305                              ASL     R5
17607 062202  006305                              ASL     R5
17608 062204  042705  177417                      BIC     #177417,R5
17609 062210  142711  000360                      BICB    #360,(R1)
17610 062214  150511                              BISB    R5,(R1)
17611 062216  010005                              MOV     R0,R5           ; PAT.CNT,*             8052
17612 062220  062705  000003                      ADD     #3,R5
17613 062224  000305                              SWAB    R5
17614 062226  042705  170377                      BIC     #170377,R5
17615 062232  042711  007400                      BIC     #7400,(R1)
17616 062236  050511                              BIS     R5,(R1)
17617 062240  010005                              MOV     R0,R5           ; PAT.CNT,*             8053
17618 062242  062705  000004                      ADD     #4,R5
17619 062246  000305                              SWAB    R5
17620 062250  006305                              ASL     R5
17621 062252  006305                              ASL     R5
17622 062254  006305                              ASL     R5
17623 062256  006305                              ASL     R5
17624 062260  042705  007777                      BIC     #7777,R5
17625 062264  042711  170000                      BIC     #170000,(R1)
17626 062270  050511                              BIS     R5,(R1)
17627 062272  005203                              INC     R3              ; WRD.CNT               8054
17628 062274  062700  000004                      ADD     #4,R0           ; *,PAT.CNT             8048
17629 062300  020027  000013                      CMP     R0,#13          ; PAT.CNT,*
17630 062304  003715                              BLE     2$
17631 062306  005202                              INC     R2              ; CNT                   8046
17632 062310  020227  000077                      CMP     R2,#77          ; CNT,*
17633 062314  003707                              BLE     1$
17634 062316  104402                    3$:       TRAP    2               ;                       8055
17635 062320  152777  000040  130666              BISB    #40,@ML.REG+40  ;                       8057
17636 062326  016702  131250                      MOV     ML.DUT,R2
17637 062332  042702  177770                      BIC     #177770,R2
17638 062336  142777  000007  130650              BICB    #7,@ML.REG+40
17639 062344  150277  130644                      BISB    R2,@ML.REG+40
17640 062350  004767  133514                      JSR     PC,GD.BLK.XFER  ;                       8059
17641 062354  012777  000061  130572              MOV     #61,@ML.REG     ;                       8060
17642 062362  105777  130636            4$:       TSTB    @ML.REG+50
17643 062366  100375                              BPL     4$
17644 062370  152777  000040  130616              BISB    #40,@ML.REG+40  ;                       8061
17645 062376  016702  131200                      MOV     ML.DUT,R2
17646 062402  042702  177770                      BIC     #177770,R2
17647 062406  142777  000007  130600              BICB    #7,@ML.REG+40
```

```
                                                                                                    14-May-1981 13:48:54    TOPS
                                                                                                    14-May-1981 13:05:08    PA:<
17649                                   ;ML4
17650                                   ;
17651
17652 062414  150277  130574                BISB    R2,@ML.REG+40
17653 062420  005066  000004                CLR     4(SP)                   ; NIB.IGNORE                            8063
17654 062424  005004                        CLR     R4                      ; PASS.CNT                              8064
17655 062426  005003                        CLR     R3                      ; NIB.PAT                               8065
17656 062430  005005                        CLR     R5                      ; BAD.NIB.CNT                           8066
17657 062432  004767  131524              JSR     PC,DAT.DM.XFER          ;                                       8067
17658 062436  012777  000071  130510        MOV     #71,@ML.REG             ;                                       8068
17659 062444  012701  000001                MOV     #1,R1                   ; *,$$TMP2                              8069
17660 062450  001411              5$:       BEQ     8$
17661 062452  016702  117440                MOV     L$DLY,R2                ; *,$$TMP1
17662 062456  001404                        BEQ     7$
17663 062460  005066  000006        6$:     CLR     6(SP)                   ; $$TMP
17664 062464  005302                        DEC     R2                      ; $$TMP1
17665 062466  001374                        BNE     6$
17666 062470  005301                7$:     DEC     R1                      ; $$TMP2
17667 062472  000766                        BR      5$
17668 062474  017767  130704  130416  8$:   MOV     @ML.REG+230,PD.TEMP     ;                                       8073
17669 062502  152777  000020  130564        BISB    #20,@ML.REG+120         ;                                       8074
17670 062510  012701  000001                MOV     #1,R1                   ; *,$$TMP2                              8075
17671 062514  001411              9$:       BEQ     12$
17672 062516  016702  117374                MOV     L$DLY,R2                ; *,$$TMP1
17673 062522  001404                        BEQ     11$
17674 062524  005066  000006        10$:    CLR     6(SP)                   ; $$TMP
17675 062530  005302                        DEC     R2                      ; $$TMP1
17676 062532  001374                        BNE     10$
17677 062534  005301                11$:    DEC     R1                      ; $$TMP2
17678 062536  000766                        BR      9$
17679 062540  017767  130600  126404  12$:   MOV     @ML.REG+170,D1.TEMP
17680 062546  017767  130602  126400        MOV     @ML.REG+200,D2.TEMP
17681 062554  017767  130554  126374        MOV     @ML.REG+160,E2.TEMP
17682 062562  005001                        CLR     R1                      ; NIB.PTR                               8078
17683 062564  010100              13$:      MOV     R1,R0                   ; NIB.PTR,*                             8081
17684 062566  006200                        ASR     R0
17685 062570  006200                        ASR     R0
17686 062572  006200                        ASR     R0
17687 062574  012702  000004                MOV     #4,R2                   ;                                       8085
17688 062600  060602                        ADD     SP,R2                   ; NIB.IGNORE,*
17689 062602  060002                        ADD     R0,R2
17690 062604  010046                        MOV     R0,-(SP)                ;                                       8081
17691 062606  062716  013120                ADD     #PD.TEMP,(SP)
17692 062612  010146                        MOV     R1,-(SP)                ; NIB.PTR,*
17693 062614  042716  177770                BIC     #177770,(SP)
17694 062620  012746  000001                MOV     #1,-(SP)
17695 062624  005046                        CLR     -(SP)
17696 062626  004767  120306                JSR     PC,BL$GT2
17697 062632  062706  000010                ADD     #10,SP
17698 062636  005700                        TST     R0
17699 062640  001066                        BNE     15$
17700 062642  010246                        MOV     R2,-(SP)                ;                                       8085
17701 062644  010146                        MOV     R1,-(SP)                ; NIB.PTR,*
17702 062646  042716  177770                BIC     #177770,(SP)
17703 062652  012746  000001                MOV     #1,-(SP)
```

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17705                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
17706                                   ;                                                       14-May-1981 13:05:08    PA:<
17707
17708 062656  005046                          CLR     -(SP)
17709 062660  004767  120254                  JSR     PC,BL$GT2
17710 062664  062706  000010                  ADD     #10,SP
17711 062670  005700                          TST     R0
17712 062672  001065                          BNE     16$
17713 062674  010146                          MOV     R1,-(SP)                ; NIB.PTR,*                     8088
17714 062676  010346                          MOV     R3,-(SP)                ; NIB.PAT,*
17715 062700  012746  000010                  MOV     #10,-(SP)
17716 062704  060616                          ADD     SP,(SP)                 ; ERR.FLG,*
17717 062706  004767  133242                  JSR     PC,TST.LNG.WRD
17718 062712  026627  000010  000001          CMP     10(SP),#1               ; ERR.FLG,*                     8090
17719 062720  001033                          BNE     14$
17720 062722  104455                          TRAP    55                      ;                               8093
17721 062724  000130                          .WORD   130
17722 062726  010570                          .WORD   ARR.DAT
17723 062730  024060                          .WORD   DUMPER
17724 062732  012746  006506                  MOV     #WRD.19,-(SP)           ;                               8094
17725 062736  012746  007774                  MOV     #FNC.5,-(SP)
17726 062742  012746  006426                  MOV     #WRD.12,-(SP)
17727 062746  012746  006406                  MOV     #WRD.10,-(SP)
17728 062752  012746  007046                  MOV     #WRD.50,-(SP)
17729 062756  012746  010172                  MOV     #FNC.18,-(SP)
17730 062762  012746  006100                  MOV     #SIX.FMT,-(SP)
17731 062766  012746  000007                  MOV     #7,-(SP)
17732 062772  010600                          MOV     SP,R0                   ; SP,*
17733 062774  104414                          TRAP    14
17734 062776  012766  000001  000026          MOV     #1,26(SP)               ; *,DODU.FLG                    8095
17735 063004  062706  000020                  ADD     #20,SP                  ;                               8092
17736 063010  062706  000006          14$:    ADD     #6,SP                   ;                               8087
17737 063014  000414                          BR      16$                     ;                               8081
17738 063016  010246          15$:    MOV     R2,-(SP)                ;                               8103
17739 063020  010146                          MOV     R1,-(SP)                ; NIB.PTR,*
17740 063022  042716  177770                  BIC     #177770,(SP)
17741 063026  012746  000001                  MOV     #1,-(SP)
17742 063032  011646                          MOV     (SP),-(SP)
17743 063034  004767  120336                  JSR     PC,BL$PU2
17744 063040  005205                          INC     R5                      ; BAD.NIB.CNT                   8104
17745 063042  062706  000010                  ADD     #10,SP                  ;                               8102
17746 063046  005203          16$:    INC     R3                      ; NIB.PAT                       8107
17747 063050  005201                          INC     R1                      ; NIB.PTR                       8078
17748 063052  020127  000010                  CMP     R1,#10                  ; NIB.PTR,*
17749 063056  003642                          BLE     13$
17750 063060  005204                          INC     R4                      ; PASS.CNT                      8110
17751 063062  020427  000161                  CMP     R4,#161                 ; PASS.CNT,*                    8112
17752 063066  001405                          BEQ     17$
17753 063070  020527  000011                  CMP     R5,#11                  ; BAD.NIB.CNT,*
17754 063074  001402                          BEQ     17$
17755 063076  000167  177372                  JMP     8$
17756 063102  104467          17$:    TRAP    67
17757 063104  006000                          ROR     R0
17758 063106  103002                          BHIS    18$
17759 063110  000167  177202                  JMP     3$
```

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17761                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
17762                                   ;                                                       14-May-1981 13:05:08    PA:<
17763
17764 063114  021627  000001            18$:    CMP     (SP),#1                 ; DODU.FLG,*                            8116
17765 063120  001004                            BNE     19$
17766 063122  016700  130452                    MOV     ML.LUN,R0               ;                                       8119
17767 063126  104451                            TRAP    51
17768 063130  104444                            TRAP    44
17769 063132  062706  000010            19$:    ADD     #10,SP                  ;                                       7982
17770 063136  000207                            RTS     PC
17771
17772                                   ; Routine Size:  265 words
17773                                   ; Maximum stack depth per invocation:  21 words
17778
17779
17783
17784                                           .SBTTL  T36
17788 063140                            T36::
17789 063140  004767  176752            1$:     JSR     PC,$T36                 ;                                       8121
17790 063144  104466                            TRAP    66
17791 063146  006000                            ROR     R0
17792 063150  103773                            BLO     1$
17793 063152  000207                            RTS     PC
17794
17795                                   ; Routine Size:  6 words
17796                                   ; Maximum stack depth per invocation:  0 words
17801
17802
17803 ;          8124  !<BLF/PAGE>
```

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14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (87)

```
17805 ;ML4
17806 ;
17807
17808 ;          8125  !
17809 ;          8126  !
17810 ;          8127  BGNTST;
17811 ;          8128
17812 ;          8129  !++
17813 ;          8130  ! TEST NUMBER:  TST 37
17814 ;          8131  !
17815 ;          8132  ! TEST NAME:    RAM BUS ADRS COUNTER TEST /READ PATH
17816 ;          8133  !
17817 ;          8134  ! TEST DESCRIPTION:
17818 ;          8135  !
17819 ;          8136  !       TEST ABILITY OF RAM/BUS ADRS
17820 ;          8137  !       COUNTERS TO LOAD/UNLOAD THE SKIP
17821 ;          8138  !       RAM DURING READ FUNCTIONS BY:
17822 ;          8139  !
17823 ;          8140  !       1.  LOADING A REPEATING COUNT OF 0
17824 ;          8141  !           TO 63 INTO THE NIBBLES OF THE
17825 ;          8142  !           FIRST 64 WORDS OF THE IO_BUF.
17826 ;          8143  !
17827 ;          8144  !       2.  VIA MBUS WRITE FUNCTION WRITE
17828 ;          8145  !           THE CONTENTS OF THE IO_BUF
17829 ;          8146  !           INTO THE GOOD BLOCK.
17830 ;          8147  !
17831 ;          8148  !       3.  CLEAR OUT THE IO_BUF
17832 ;          8149  !
17833 ;          8150  !       4.  VIA MBUS READ FUNCTION READ
17834 ;          8151  !           THE GOOD BLOCK FOR THE REPEATING
17835 ;          8152  !           COUNT OF 0 TO 63.
17836 ;          8153  !
17837 ;          8154  ! IMPLICIT INPUTS:
17838 ;          8155  !
17839 ;          8156  !       IO_BUF
17840 ;          8157  !
17841 ;          8158  !       A VECTOR OF 256 WORDS WHERE
17842 ;          8159  !       DATA FOR MBUS READS AND WRITE
17843 ;          8160  !       FUNCTION ARE FOUND.
17844 ;          8161  !
17845 ;          8162  !--
17846 ;          8163
17847 ;          8164  local
17848 ;          8165      DODU_FLG,                   !DROP UNIT FLAG
17849 ;          8166      WRD_CNT,                    !WORD COUNT
17850 ;          8167      PAT_INC,                    !PATTERN INCREMENT
17851 ;          8168      SIZ_EXP,                    !SIZE EXPRESSION
17852 ;          8169      POS_EXP,                    !POSITIONAL EXPRESSION
17853 ;          8170      TEMP;                       !TEMPORARY STORAGE LOCATION
17854 ;          8171
17855 ;          8172  CLR_MBUS;
17856 ;          8173  DODU_FLG = ZERO;
17857 ;          8174  WRD_CNT = ZERO;
17858 ;          8175
17859 ;          8176  incr COUNT from 0 to 63 do      !LOAD 64 WORDS WITH REPEATING  COUNTS OF 0-63
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (87)

;          8177
;          8178      incr PAT_CNT from -1 to 11 by 4 do          !LOAD NIBBLES IN WORD WITH REPEATING COUNT OF 0-63
;          8179          begin
;          8180          (IO_BUF [.WRD_CNT])<0, 4> = .PAT_CNT + 1;       !LOAD FIRST NIBBLE IN WORD
;          8181          (IO_BUF [.WRD_CNT])<4, 4> = .PAT_CNT + 2;       !LOAD SECOND NIBBLE IN WORD
;          8182          (IO_BUF [.WRD_CNT])<8, 4> = .PAT_CNT + 3;       !LOAD THIRD NIBBLE IN WORD
;          8183          (IO_BUF [.WRD_CNT])<12, 4> = .PAT_CNT + 4;      !LOAD FORTH NIBBLE IN WORD
;          8184          WRD_CNT = .WRD_CNT + 1;                         !INCREMENT TO NEXT WORD
;          8185          end;
;          8186
;          8187  GD_BLK_XFER ();                                        !SET UP A GOOD BLOCK XFERR
;          8188  ML[S1 = write;                                         !DO A WRITE FUNCTION
;          8189  TIME_OUT_LOOP;
;          8190  BGNSOB;
;          8191
;          8192  incr IO_CNT from 0 to 255 do                          !CLEAR OUT IO_BUF
;          8193      IO_BUF [.IO_CNT] = ZEROES;
;          8194
;          8195  CLR_MBUS;
;          8196  GD_BLK_XFER ();                                        !SET UP A GOOD BLOCK XFERR
;          8197  ML[S1 = read;                                          !DO A READ FUNCTION
;          8198  TIME_OUT_LOOP;
;          8199  CLR_MBUS;
;          8200  SIZ_EXP = 4;                                          !FIELD SIZE FOR NIBBLES ALWAYS 4 BITS
;          8201  WRD_CNT = 0;
;          8202
;          8203  incr COUNT from 0 to 63 do                            !READ 64 WORDS IN IO_BUF
;          8204
;          8205      incr PAT_CNT from -1 to 11 by 4 do                !READ REPEATING COUNTS OF 0-63
;          8206          begin
;          8207          POS_EXP = ZERO;                               !FIELD SELECTOR SELECTS THE FOUR NIBBLES
;          8208          PAT_INC = ONE;
;          8209          TEMP = .IO_BUF [.WRD_CNT];                    !GET A WORD OUT OF IO_BUF
;          8210
;          8211          incr CNT from 0 to 3 do                       !READ THE FOUR NIBBLES IN WORD
;          8212              begin
;          8213
;          8214              if .TEMP<.POS_EXP, .SIZ_EXP> neq (.PAT_CNT + .PAT_INC)
;          8215                                                        !COMPARE NIBBLE WITH RESPECTIVE 0 -63 CNT
;          8216              then
;          8217                  begin                                 !ERROR AND SET DODU_FLG IF NEQ
;          8218                  ERRDF (89, ARR_DAT, DUMPER);
;          8219                  PRINTB (SIX_FMT, FNC_18, WRD_50, WRD_10, WRD_12, FNC_6, WRD_19);
;          8220                  DODU_FLG = ONE;
;          8221                  end;
;          8222
;          8223              POS_EXP = .POS_EXP + 4;                   !POINT TO THE NEXT NIBBLE IN WORD
;          8224              PAT_INC = .PAT_INC + 1;                   !INCREMENT THE 0-63 COUNT
;          8225              end;
;          8226
;          8227          WRD_CNT = .WRD_CNT + 1;                       !GET THE NEXT IO_BUF WORD
;          8228          end;
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (87)

17917 ;ML4
17918 ;
17919
17920 ;          8229
17921 ;          8230  ENDSUB;
17922 ;          8231
17923 ;          8232  if .DODU_FLG IS_SET                          !DROP THIS UNIT IF DODU_FLG SET
17924 ;          8233  then
17925 ;          8234      begin
17926 ;          8235      DODU (.ML_LUN);
17927 ;          8236      DOCLN;
17928 ;          8237      end;
17929 ;          8238
17930 ;          8239  ENDTST;
17934
17935                                          .SBTTL  $T37
17939 063154  004167  120736          $T37:   JSR     R1,$SAVE5                ;                                  8123
17940 063160  162706  000012                  SUB     #12,SP
17941 063164  152777  000040  130022          BISB    #40,@ML.REG+40           ;                                  8170
17942 063172  016705  130404                  MOV     ML.DUT,R5
17943 063176  042705  177770                  BIC     #177770,R5
17944 063202  142777  000007  130004          BICB    #7,@ML.REG+40
17945 063210  150577  130000                  BISB    R5,@ML.REG+40
17946 063214  005066  000010                  CLR     10(SP)                   ; DODU.FLG                         8173
17947 063220  005066  000002                  CLR     2(SP)                    ; WRD.CNT                          8174
17948 063224  005002                          CLR     R2                       ; COUNT                            8176
17949 063226  012703  177777          1$:     MOV     #-1,R3                   ; *,PAT.CNT                        8178
17950 063232  016604  000002          2$:     MOV     2(SP),R4                 ; WRD.CNT,*                        8180
17951 063236  006304                          ASL     R4
17952 063240  062704  011600                  ADD     #IO.BUF,R4
17953 063244  010305                          MOV     R3,R5                    ; PAT.CNT,*
17954 063246  005205                          INC     R5
17955 063250  042705  177760                  BIC     #177760,R5
17956 063254  142714  000017                  BICB    #17,(R4)
17957 063260  150514                          BISB    R5,(R4)
17958 063262  010305                          MOV     R3,R5                    ; PAT.CNT,*                        8181
17959 063264  062705  000002                  ADD     #2,R5
17960 063270  006305                          ASL     R5
17961 063272  006305                          ASL     R5
17962 063274  006305                          ASL     R5
17963 063276  006305                          ASL     R5
17964 063300  042705  177417                  BIC     #177417,R5
17965 063304  142714  000360                  BICB    #360,(R4)
17966 063310  150514                          BISB    R5,(R4)
17967 063312  010305                          MOV     R3,R5                    ; PAT.CNT,*                        8182
17968 063314  062705  000003                  ADD     #3,R5
17969 063320  000305                          SWAB    R5
17970 063322  042705  170377                  BIC     #170377,R5
17971 063326  042714  007400                  BIC     #7400,(R4)
```

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17973                          ;ML4                                                    14-May-1981 13:48:54    TOPS
17974                          ;                                                       14-May-1981 13:05:08    PA:<
17975
17976 063332 050514                    BIS     R5,(R4)
17977 063334 010305                    MOV     R3,R5                   ; PAT.CNT,*                             8183
17978 063336 062705 000004             ADD     #4,R5
17979 063342 000305                    SWAB    R5
17980 063344 006305                    ASL     R5
17981 063346 006305                    ASL     R5
17982 063350 006305                    ASL     R5
17983 063352 006305                    ASL     R5
17984 063354 042705 007777             BIC     #7777,R5
17985 063360 042714 170000             BIC     #170000,(R4)
17986 063364 050514                    BIS     R5,(R4)
17987 063366 005266 000002             INC     2(SP)                   ; WRD.CNT                               8184
17988 063372 062703 000004             ADD     #4,R3                   ; *,PAT.CNT                             8178
17989 063376 020327 000013             CMP     R3,#13                  ; PAT.CNT,*
17990 063402 003713                    BLE     2$
17991 063404 005202                    INC     R2                      ; COUNT                                 8176
17992 063406 020227 000077             CMP     R2,#77                  ; COUNT,*
17993 063412 003705                    BLE     1$
17994 063414 004767 132450             JSR     PC,GD.BLK.XFER          ;                                       8187
17995 063420 012777 000061 127526      MOV     #61,@ML.REG             ;                                       8188
17996 063426 105777 127572      3$:    TSTB    @ML.REG+50
17997 063432 100375                    BPL     3$
17998 063434 104402             4$:    TRAP    2                       ;                                       8189
17999 063436 005003                    CLR     R3                      ; IO.CNT                                8192
18000 063440 010304             5$:    MOV     R3,R4                   ; IO.CNT,*                              8193
18001 063442 006304                    ASL     R4
18002 063444 005064 011600             CLR     IO.BUF(R4)
18003 063450 005203                    INC     R3                      ; IO.CNT                                8192
18004 063452 020327 000377             CMP     R3,#377                 ; IO.CNT,*
18005 063456 003770                    BLE     5$
18006 063460 152777 000040 127526      BISB    #40,@ML.REG+40          ;                                       8193
18007 063466 016704 130110             MOV     ML.DUT,R4
18008 063472 042704 177770             BIC     #177770,R4
18009 063476 142777 000007 127510      BICB    #7,@ML.REG+40
18010 063504 150477 127504             BISB    R4,@ML.REG+40
18011 063510 004767 132354             JSR     PC,GD.BLK.XFER          ;                                       8196
18012 063514 012777 000071 127432      MOV     #71,@ML.REG             ;                                       8197
18013 063522 105777 127476      6$:    TSTB    @ML.REG+50
18014 063526 100375                    BPL     6$
18015 063530 152777 000040 127456      BISB    #40,@ML.REG+40          ;                                       8198
18016 063536 016704 130040             MOV     ML.DUT,R4
18017 063542 042704 177770             BIC     #177770,R4
18018 063546 142777 000007 127440      BICB    #7,@ML.REG+40
18019 063554 150477 127434             BISB    R4,@ML.REG+40
18020 063560 012766 000004 000006      MOV     #4,6(SP)                ; *,SIZ.EXP                             8200
18021 063566 005066 000002             CLR     2(SP)                   ; WRD.CNT                               8201
18022 063572 005001                    CLR     R1                      ; COUNT                                 8203
18023 063574 012703 177777      7$:    MOV     #-1,R3                  ; *,PAT.CNT                             8205
18024 063600 005005             8$:    CLR     R5                      ; POS.EXP                               8207
18025 063602 012716 000001             MOV     #1,(SP)                 ; *,PAT.INC                             8208
18026 063606 016604 000002             MOV     2(SP),R4                ; WRD.CNT,*                             8209
18027 063612 006304                    ASL     R4
```

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18029                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
18030                                   ;                                                       14-May-1981 13:05:08    PA:<
18031
18032 063614  016466  011600  000004          MOV     IO.BUF(R4),4(SP)        ; *,TEMP
18033 063622  005002                          CLR     R2                      ; CNT                                   8211
18034 063624  016646  000004          9$:     MOV     4(SP),-(SP)             ; TEMP,*                                8214
18035 063630  010546                          MOV     R5,-(SP)                ; POS.EXP,*
18036 063632  016646  000012                  MOV     12(SP),-(SP)            ; SIZ.EXP,*
18037 063636  005046                          CLR     -(SP)
18038 063640  004767  117152                  JSR     PC,BL$GT1
18039 063644  062706  000010                  ADD     #10,SP
18040 063650  010304                          MOV     R3,R4                   ; PAT.CNT,*
18041 063652  061604                          ADD     (SP),R4                 ; PAT.INC,*
18042 063654  020004                          CMP     R0,R4
18043 063656  001433                          BEQ     10$
18044 063660  104455                          TRAP    55                      ;                                       8218
18045 063662  000131                          .WORD   131
18046 063664  010570                          .WORD   ARR.DAT
18047 063666  024060                          .WORD   DUMPER
18048 063670  012746  006506                  MOV     #WRD.19,-(SP)           ;                                       8219
18049 063674  012746  010004                  MOV     #FNC.6,-(SP)
18050 063700  012746  006426                  MOV     #WRD.12,-(SP)
18051 063704  012746  006406                  MOV     #WRD.10,-(SP)
18052 063710  012746  007046                  MOV     #WRD.50,-(SP)
18053 063714  012746  010172                  MOV     #FNC.18,-(SP)
18054 063720  012746  006100                  MOV     #SIX.FMT,-(SP)
18055 063724  012746  000007                  MOV     #7,-(SP)
18056 063730  010600                          MOV     SP,R0                   ; SP,*
18057 063732  104414                          TRAP    14
18058 063734  012766  000001  000030          MOV     #1,30(SP)               ; *,DODU.FLG                            8220
18059 063742  062706  000020                  ADD     #20,SP                  ;                                       8217
18060 063746  062705  000004          10$:    ADD     #4,R5                   ; *,POS.EXP                             8223
18061 063752  005216                          INC     (SP)                    ; PAT.INC                               8224
18062 063754  005202                          INC     R2                      ; CNT                                   8211
18063 063756  020227  000003                  CMP     R2,#3                   ; CNT,*
18064 063762  003720                          BLE     9$
18065 063764  005266  000002                  INC     2(SP)                   ; WRD.CNT                               8227
18066 063770  062703  000004                  ADD     #4,R3                   ; *,PAT.CNT                             8205
18067 063774  020327  000013                  CMP     R3,#13                  ; PAT.CNT,*
18068 064000  003677                          BLE     8$
18069 064002  005201                          INC     R1                      ; COUNT                                 8203
18070 064004  020127  000077                  CMP     R1,#77                  ; COUNT,*
18071 064010  003671                          BLE     7$
18072 064012  104467                          TRAP    67                      ;                                       8228
18073 064014  006000                          ROR     R0
18074 064016  103606                          BLO     4$
18075 064020  026627  000010  000001          CMP     10(SP),#1               ; DODU.FLG,*                            8232
18076 064026  001004                          BNE     11$
18077 064030  016700  127544                  MOV     ML.LUN,R0               ;                                       8235
18078 064034  104451                          TRAP    51
18079 064036  104444                          TRAP    44
18080 064040  062706  000012          11$:    ADD     #12,SP                  ;                                       8123
18081 064044  000207                          RTS     PC
18082
18083                                   ; Routine Size:  221 words
```

```
18085                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
18086                                   ;                                                       14-May-1981 13:05:08    PA:<
18087
18088                                   ; Maximum stack depth per invocation:  19 words
18093
18094
18098
18099                                           .SBTTL  T37
18103 064046                            T37::
18104 064046  004767  177102            1$:     JSR     PC,$T37                         ;                               8237
18105 064052  104466                            TRAP    66
18106 064054  006000                            ROR     R0
18107 064056  103773                            BLO     1$
18108 064060  000207                            RTS     PC
18109
18110                                   ; Routine Size:  6 words
18111                                   ; Maximum stack depth per invocation:  0 words
18116
18117
18118 ;         8240  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (88)

```
18120 ;ML4
18121 ;
18122
18123 ;          8241  !
18124 ;          8242  !
18125 ;          8243  BGNTST;
18126 ;          8244
18127 ;          8245  !++
18128 ;          8246  ! TEST NUMBER:  TST 38
18129 ;          8247  !
18130 ;          8248  ! TEST NAME:    SYNC DATA BUS BIT UNIQUENESS TEST/WRITE PATH
18131 ;          8249  !
18132 ;          8250  ! TEST DESCRIPTION:
18133 ;          8251  !
18134 ;          8252  !       TEST SYNCHRONOUS DATA BUS FOR
18135 ;          8253  !       DATA BIT UNIQUENESS BY:
18136 ;          8254  !
18137 ;          8255  !       1.  LOADING THE FIRST 16 WORDS IN
18138 ;          8256  !           THE IO_BUF WITH A SHIFTING
18139 ;          8257  !           ZERO IN A FIELD OF ONES PATTERN.
18140 ;          8258  !
18141 ;          8259  !       2.  VIA MBUS WRITE FUNCTION WRITE
18142 ;          8260  !           SHIFTING PATTERN THROUGH THE
18143 ;          8261  !           DATA BUS AND INTO THE GOOD
18144 ;          8262  !           BLOCK.
18145 ;          8263  !
18146 ;          8264  !       3.  VIA DAT_DM MODE READ THE
18147 ;          8265  !           GOOD BLOCK AND SAVE ALL GOOD
18148 ;          8266  !           NIBBLE DATA, IN THEIR PROPER
18149 ;          8267  !           SEQUENCE, INTO A STACK
18150 ;          8268  !           STRUCTURE.
18151 ;          8269  !
18152 ;          8270  !       4.  INTERRIGATE STACK STRUCTURE FOR
18153 ;          8271  !           SHIFTED DATA PATTERN.
18154 ;          8272  !
18155 ;          8273  !
18156 ;          8274  ! IMPLICIT INPUTS:
18157 ;          8275  !
18158 ;          8276  !       PD_TEMP
18159 ;          8277  !       A BIT VECTOR OF 16 BITS WHERE
18160 ;          8278  !       THE READ PROM DATA IS STORED
18161 ;          8279  !       AND ACCESSED FROM.
18162 ;          8280  !
18163 ;          8281  !       IO_BUF
18164 ;          8282  !       A VECTOR OF 256 WORDS WHERE
18165 ;          8283  !       DATA FOR MBUS READS AND WRITE
18166 ;          8284  !       FUNCTION ARE FOUND.
18167 ;          8285  !
18168 ;          8286  !       STACK
18169 ;          8287  !       A VECTOR OF 198 BYTE LOCATIONS
18170 ;          8288  !       WHERE GOOD NIBBLE DATA IS STORED
18171 ;          8289  !       WHEN STRIPPING AWAY BAD NIBBLE
18172 ;          8290  !       LOCATIONS OF A BLOCK.
18173 ;          8291  !
18174 ;          8292  !
```

```
18176 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
18177 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (88)
18178
18179 ;          8293  !--
18180 ;          8294
18181 ;          8295  local
18182 ;          8296      SAV_NIB,                            !STORES THE SHIFTED BIT PATTERN
18183 ;          8297      DODU_FLG,                           !DROP UNIT FLAG
18184 ;          8298      NIB_BIT,                            !NIBBLE PATTERN
18185 ;          8299      TST_PAT,                            !TEST PATTERN
18186 ;          8300      ALL_ONES_1,                         !HOW MANY '17' NIBBLE PATTERN POSITION TO READ
18187 ;          8301      ALL_ONES_2,                         !HOW MANY '17' NIBBLE PATTERN POSITION TO READ
18188 ;          8302      STK_PTR,                            !STACK POINTER
18189 ;          8303      COUNT;                              !COUNTER
18190 ;          8304
18191 ;          8305  BGNSUB;
18192 ;          8306  CLR_MBUS;
18193 ;          8307  DODU_FLG = ZERO;
18194 ;          8308  TST_PAT = ONE;                          !ONE IN A FIELD OF ZEROES
18195 ;          8309
18196 ;          8310  incr CNT from 0 to 15 do                !WRITE 16 WORDS WITH SHIFTING 0 IN FIELD OF 1'S.
18197 ;          8311      begin
18198 ;          8312      IO_BUF [.CNT] = not .TST_PAT;
18199 ;          8313      TST_PAT = .TST_PAT^ONE;
18200 ;          8314      end;
18201 ;          8315
18202 ;          8316  GD_BLK_XFER ();                         !SET UP A GOOD BLOCK XFERR
18203 ;          8317  MLCS1 = write;                          !WRITE SHIFTING PATTERN THROUGH SYNC BUS
18204 ;          8318  TIME_OUT_LOOP;
18205 ;          8319  STRIPPER (21, 8);                       !CALL ROUTINE TO STRIP OUT BAD NIBBLE DATA FROM ARRAY WORDS
18206 ;          8320  STK_PTR = -1;                           !RESET THE STACK POINTER
18207 ;          8321  NIB_BIT = ONE;                          !SHIFTING NIBBLE PAT OF 1 IN FIELD OF 0'S
18208 ;          8322  ALL_ONES_1 = ZERO;                      !READ NO '17' NIBBLE PATTERN ON FIRST PASS
18209 ;          8323  ALL_ONES_2 = 3;                         !READ THREE '17' NIBBLE PATTERN ON FIRST PASS
18210 ;          8324
18211 ;          8325  incr BY_FOUR_WRDS from 0 to 3 do        !READ 4 GROUPS OF 4 WORDS
18212 ;          8326      begin
18213 ;          8327
18214 ;          8328      incr BY_ONE_WRD from 0 to 3 do      !READ 4 GROUPS OF 1 WORD
18215 ;          8329          begin
18216 ;          8330          COUNT = ZERO;                   !CLEAR COUNT
18217 ;          8331
18218 ;          8332          until .COUNT eql .ALL_ONES_1 do !READ X NUMBER OF '17' NIBBLE PAT
18219 ;          8333              begin
18220 ;          8334              COUNT = .COUNT + 1;         !INCREMENT COUNT
18221 ;          8335              STK_PTR = .STK_PTR + 1;     !INCREMENT STACK POINTER
18222 ;          8336
18223 ;          8337              if (.stack [.STK_PTR]) neq %o'000017'       !COMPARE STACK WITH '17'
18224 ;          8338              then
18225 ;          8339                  begin                   !ERROR AND SET DODU_FLG IF NEQ
18226 ;          8340                  ERRDF (90, SYNC, DUMPER);
18227 ;          8341                  PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
18228 ;          8342                  PRINTB (FMT_5, ONES, .stack [.STK_PTR], .STK_PTR);
18229 ;          8343                  DODU_FLG = ONE;
18230 ;          8344                  end;
```

```
18232 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
18233 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (88)
18234
18235 ;          8345
18236 ;          8346          end;
18237 ;          8347
18238 ;          8348     STK_PTR = .STK_PTR + 1;                    !INCREMENT THE STACK POINTER
18239 ;          8349     SAV_NIB = ( not .NIB_BIT) and (%o'000017');     !GENERATE THE SHIFTED BIT
18240 ;          8350
18241 ;          8351     if (.stack [.STK_PTR]) neq (.SAV_NIB)      !COMPARE STACK TO SHIFTED BIT
18242 ;          8352     then
18243 ;          8353          begin                                 !ERROR AND SET DODU_FLG IF NEQ
18244 ;          8354          ERRDF (91, SYNC, DUMPER);
18245 ;          8355          PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
18246 ;          8356          PRINTB (FMT_15, .STK_PTR);
18247 ;          8357          PRINTB (FMT_5, .SAV_NIB, .stack [.STK_PTR]);
18248 ;          8358          DODU_FLG = ONE;
18249 ;          8359          end;
18250 ;          8360
18251 ;          8361     COUNT = ZEROES;                            !CLEAR COUNT
18252 ;          8362
18253 ;          8363     until .COUNT eql .ALL_ONES_2 do            !READ X NUMBER OF '17' NIBBLE PAT
18254 ;          8364          begin
18255 ;          8365          COUNT = .COUNT + 1;                   !INCREMENT COUNT
18256 ;          8366          STK_PTR = .STK_PTR + 1;               !INCREMENT STACK POINTER
18257 ;          8367
18258 ;          8368          if (.stack [.STK_PTR]) neq %o'000017'      !COMPARE STACK POINTER WITH  '17'
18259 ;          8369          then
18260 ;          8370               begin                            !ERROR AND SET DODU_FLG IF SET
18261 ;          8371               ERRDF (92, SYNC, DUMPER);
18262 ;          8372               PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
18263 ;          8373               PRINTB (FMT_5, ONES, .stack [.STK_PTR], .STK_PTR);
18264 ;          8374               DODU_FLG = ONE;
18265 ;          8375               end;
18266 ;          8376
18267 ;          8377               end;
18268 ;          8378
18269 ;          8379          NIB_BIT = .NIB_BIT^ONE;                !SHIFT THE SHIFTED NIBBLE BIT
18270 ;          8380          end;
18271 ;          8381
18272 ;          8382     NIB_BIT = ONE;                             !RESET THE SHIFTED NIBBLE BIT
18273 ;          8383     ALL_ONES_1 = .ALL_ONES_1 + 1;              !READ ONE MORE '17' PATTERN
18274 ;          8384     ALL_ONES_2 = .ALL_ONES_2 - 1;              !READ ONE LESS '17' PATTERN
18275 ;          8385     end;
18276 ;          8386
18277 ;          8387 ENDSUB;
18278 ;          8388
18279 ;          8389 if .DODU_FLG IS_SET                            !DROP THIS UNIT IF DODU_FLG SET
18280 ;          8390 then
18281 ;          8391     begin
18282 ;          8392     DODU (.ML_LUN);
18283 ;          8393     DOCLN;
18284 ;          8394     end;
18285 ;          8395
18286 ;          8396 ENDTST;
```

```
18288 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
18289 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (88)
18290
18294
18295                                          .SBTTL  $T38
18299 064062 004167 120030          $T38:  JSR     R1,$SAVE5                ;                                  8239
18300 064066 162706 000012                 SUB     #12,SP
18301 064072 104402                 1$:    TRAP    2                        ;                                  8303
18302 064074 152777 000040 127112          BISB    #40,@ML.REG+40           ;                                  8305
18303 064102 016705 127474                 MOV     ML.DUT,R5
18304 064106 042705 177770                 BIC     #177770,R5
18305 064112 142777 000007 127074          BICB    #7,@ML.REG+40
18306 064120 150577 127070                 BISB    R5,@ML.REG+40
18307 064124 005001                        CLR     R1                       ; DODU.FLG                         8307
18308 064126 012766 000001 000006          MOV     #1,6(SP)                 ; *,TST.PAT                        8308
18309 064134 005004                        CLR     R4                       ; CNT                              8310
18310 064136 010405                 2$:    MOV     R4,R5                    ; CNT,*                            8312
18311 064140 006305                        ASL     R5
18312 064142 016665 000006 011600          MOV     6(SP),IO.BUF(R5)         ; TST.PAT,*
18313 064150 005165 011600                 COM     IO.BUF(R5)
18314 064154 006366 000006                 ASL     6(SP)                    ; TST.PAT                          8313
18315 064160 005204                        INC     R4                       ; CNT                              8310
18316 064162 020427 000017                 CMP     R4,#17                   ; CNT,*
18317 064166 003763                        BLE     2$
18318 064170 004767 131674                 JSR     PC,GD.BLK.XFER           ;                                  8316
18319 064174 012777 000061 126752          MOV     #61,@ML.REG              ;                                  8317
18320 064202 105777 127016                 TSTB    @ML.REG+50
18321 064206 100375                        BPL     3$
18322 064210 012746 000025                 MOV     #25,-(SP)                ;                                  8319
18323 064214 012746 000010                 MOV     #10,-(SP)
18324 064220 004767 127770                 JSR     PC,STRIPPER
18325 064224 012702 177777                 MOV     #-1,R2                   ; *,STK.PTR                        8320
18326 064230 012766 000001 000004          MOV     #1,4(SP)                 ; *,NIB.BIT                        8321
18327 064236 005066 000010                 CLR     10(SP)                   ; ALL.ONES.1                       8322
18328 064242 012766 000003 000006          MOV     #3,6(SP)                 ; *,ALL.ONES.2                     8323
18329 064250 005004                        CLR     R4                       ; BY.FOUR.WRDS                     8325
18330 064252 005005                 4$:    CLR     R5                       ; BY.ONE.WRD                       8328
18331 064254 005003                 5$:    CLR     R3                       ; COUNT                            8330
18332 064256 020366 000010          6$:    CMP     R3,10(SP)                ; COUNT,ALL.ONES.1                 8332
18333 064262 001455                        BEQ     7$
18334 064264 005203                        INC     R3                       ; COUNT                            8334
18335 064266 005202                        INC     R2                       ; STK.PTR                          8335
18336 064270 126227 012612 000017          CMPB    STACK(R2),#17            ; *(STK.PTR),*                     8337
18337 064276 001767                        BEQ     6$
18338 064300 104455                        TRAP    55                       ;                                  8340
18339 064302 000132                        .WORD   132
18340 064304 010526                        .WORD   SYNC
18341 064306 024060                        .WORD   DUMPER
18342 064310 012746 006506                 MOV     #WRD.19,-(SP)            ;                                  8341
```

```
18344                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
18345                                   ;                                                       14-May-1981 13:05:08    PA:<
18346
18347 064314  012746  007774                   MOV     #FNC.5,-(SP)
18348 064320  012746  006426                   MOV     #WRD.12,-(SP)
18349 064324  012746  007454                   MOV     #PHR.4,-(SP)
18350 064330  012746  006716                   MOV     #WRD.39,-(SP)
18351 064334  012746  006544                   MOV     #WRD.23,-(SP)
18352 064340  012746  006100                   MOV     #SIX.FMT,-(SP)
18353 064344  012746  000007                   MOV     #7,-(SP)
18354 064350  010600                           MOV     SP,R0                   ; SP,*
18355 064352  104414                           TRAP    14
18356 064354  010216                           MOV     R2,(SP)                 ; STK.PTR,*                             8342
18357 064356  005046                           CLR     -(SP)
18358 064360  116216  012612                   MOVB    STACK(R2),(SP)          ; *(STK.PTR),*
18359 064364  012746  177777                   MOV     #-1,-(SP)
18360 064370  012746  004430                   MOV     #FMT.5,-(SP)
18361 064374  012746  000004                   MOV     #4,-(SP)
18362 064400  010600                           MOV     SP,R0                   ; SP,*
18363 064402  104414                           TRAP    14
18364 064404  012701  000001                   MOV     #1,R1                   ; *,DODU.FLG                            8343
18365 064410  062706  000030                   ADD     #30,SP                  ;                                       8339
18366 064414  000720                           BR      6$                      ;                                       8332
18367 064416  005202                   7$:     INC     R2                      ; STK.PTR                               8348
18368 064420  012766  000017  000014         MOV     #17,14(SP)              ; *,SAV.NIB                             8349
18369 064426  046666  000004  000014         BIC     4(SP),14(SP)            ; NIB.BIT,SAV.NIB
18370 064434  005000                           CLR     R0                      ;                                       8351
18371 064436  156200  012612                   BISB    STACK(R2),R0            ; *(STK.PTR),*
18372 064442  020066  000014                   CMP     R0,14(SP)               ; *,SAV.NIB
18373 064446  001454                           BEQ     8$
18374 064450  104455                           TRAP    55                      ;                                       8354
18375 064452  000133                           .WORD   133
18376 064454  010526                           .WORD   SYNC
18377 064456  024060                           .WORD   DUMPER
18378 064460  012746  006506                   MOV     #WRD.19,-(SP)           ;                                       8355
18379 064464  012746  007774                   MOV     #FNC.5,-(SP)
18380 064470  012746  006426                   MOV     #WRD.12,-(SP)
18381 064474  012746  007454                   MOV     #PHR.4,-(SP)
18382 064500  012746  006716                   MOV     #WRD.39,-(SP)
18383 064504  012746  006544                   MOV     #WRD.23,-(SP)
18384 064510  012746  006100                   MOV     #SIX.FMT,-(SP)
18385 064514  012746  000007                   MOV     #7,-(SP)
18386 064520  010600                           MOV     SP,R0                   ; SP,*
18387 064522  104414                           TRAP    14
18388 064524  010216                           MOV     R2,(SP)                 ; STK.PTR,*                             8356
18389 064526  012746  005150                   MOV     #FMT.15,-(SP)
18390 064532  012746  000002                   MOV     #2,-(SP)
18391 064536  010600                           MOV     SP,R0                   ; SP,*
18392 064540  104414                           TRAP    14
18393 064542  005016                           CLR     (SP)                    ;                                       8357
18394 064544  116216  012612                   MOVB    STACK(R2),(SP)          ; *(STK.PTR),*
18395 064550  016646  000040                   MOV     40(SP),-(SP)            ; SAV.NIB,*
18396 064554  012746  004430                   MOV     #FMT.5,-(SP)
18397 064560  012746  000003                   MOV     #3,-(SP)
18398 064564  010600                           MOV     SP,R0                   ; SP,*
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                        TRAP    14
                                        MOV     #1,R1                   ; *,DODU.FLG                            8358
                                        ADD     #32,SP                  ;                                       8353
                                8$:     CLR     R3                      ; COUNT                                 8361
                                9$:     CMP     R3,6(SP)                ; COUNT,ALL.ONES.2                      8363
                                        BEQ     10$
                                        INC     R3                      ; COUNT                                 8365
                                        INC     R2                      ; STK.PTR                               8366
                                        CMPB    STACK(R2),#17           ; *(STK.PTR),*                          8368
                                        BEQ     9$
                                        TRAP    55                      ;                                       8371
                                        .WORD   134
                                        .WORD   SYNC
                                        .WORD   DUMPER
                                        MOV     #WRD.19,-(SP)           ;                                       8372
                                        MOV     #FNC.5,-(SP)
                                        MOV     #WRD.12,-(SP)
                                        MOV     #PHR.4,-(SP)
                                        MOV     #WRD.39,-(SP)
                                        MOV     #WRD.23,-(SP)
                                        MOV     #SIX.FMT,-(SP)
                                        MOV     #7,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        MOV     R2,(SP)                 ; STK.PTR,*                             8373
                                        CLR     -(SP)
                                        MOVB    STACK(R2),(SP)          ; *(STK.PTR),*
                                        MOV     #-1,-(SP)
                                        MOV     #FMT.5,-(SP)
                                        MOV     #4,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        MOV     #1,R1                   ; *,DODU.FLG                            8374
                                        ADD     #30,SP                  ;                                       8370
                                        BR      9$                      ;                                       8363
                                10$:    ASL     4(SP)                   ; NIB.BIT                               8379
                                        INC     R5                      ; BY.ONE.WRD                            8328
                                        CMP     R5,#3                   ; BY.ONE.WRD,*
                                        BGT     11$
                                        JMP     5$
                                11$:    MOV     #1,4(SP)                ; *,NIB.BIT                             8382
                                        INC     10(SP)                  ; ALL.ONES.1                            8383
                                        DEC     6(SP)                   ; ALL.ONES.2                            8384
                                        INC     R4                      ; BY.FOUR.WRDS                          8325
                                        CMP     R4,#3                   ; BY.FOUR.WRDS,*
                                        BGT     12$
                                        JMP     4$
                                12$:    CMP     (SP)+,(SP)+             ;                                       8303
                                        TRAP    67                      ;                                       8385
                                        ROR     R0
                                        BHIS    13$
                                        JMP     1$
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                        13$:    DEC     R1                      ; DODU.FLG                                      8389
                                BNE     14$
                                MOV     ML.LUN,R0               ;                       8392
                                TRAP    51
                                TRAP    44
                        14$:    ADD     #12,SP                  ;                       8239
                                RTS     PC

                ; Routine Size:  252 words
                ; Maximum stack depth per invocation:  26 words


                                .SBTTL  T38
                        T38::
                        1$:     JSR     PC,$T38                 ;                       8394
                                TRAP    66
                                ROR     R0
                                BLO     1$
                                RTS     PC

                ; Routine Size:  6 words
                ; Maximum stack depth per invocation:  0 words

;               8397    !<BLF/PAGE>
```

```
18500 ;ML4
18501 ;
18502
18503 ;          8398  !
18504 ;          8399  BGNTST;
18505 ;          8400
18506 ;          8401  !++
18507 ;          8402  ! TEST NUMBER:  TST 39
18508 ;          8403  !
18509 ;          8404  ! TEST NAME:    SYNC DATA BUS BIT UNIQUENESS TEST/READ PATH
18510 ;          8405  !
18511 ;          8406  ! TEST DESCRIPTION:
18512 ;          8407  !       TEST SYNCHRONOUS DATA BUS READ
18513 ;          8408  !       PATH FOR DATA BIT UNIQUENESS BY:
18514 ;          8409  !
18515 ;          8410  !       1.  LOADING THE FIRST 16 WORDS IN THE IO_BUF WITH A SHIFTING
18516 ;          8411  !           ZERO IN A FIELD OF ONES PATTERN.
18517 ;          8412  !
18518 ;          8413  !       2.  VIA MBUS WRITE FUNCTION WRITE SHIFTING PATTERN INTO THE GOOD BLOCK.
18519 ;          8414  !
18520 ;          8415  !       3.  CLEAR THE IO_BUF.
18521 ;          8416  !
18522 ;          8417  !       4.  VIA MBUS READ FUNCTION READ THE SHIFTING PATTERN THROUGH THE
18523 ;          8418  !           READ PATH.
18524 ;          8419  !
18525 ;          8420  !       5.  INTERIGATE THE IO_BUF FOR THE SHIFTING PATTERN.
18526 ;          8421  !
18527 ;          8422  ! IMPLICIT INPUTS:
18528 ;          8423  !       IO_BUF
18529 ;          8424  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTION ARD FOUND.
18530 ;          8425  !--
18531 ;          8426
18532 ;          8427  local
18533 ;          8428      DODU_FLG,                          !DROP UNIT FLAG
18534 ;          8429      TST_PAT;                           !TEST PATTERN
18535 ;          8430
18536 ;          8431  CLR_MBUS;
18537 ;          8432  DODU_FLG = ZERO;
18538 ;          8433  TST_PAT = ONE;                         !ONE IN A FIELD OF ZEROES
18539 ;          8434
18540 ;          8435  incr CNT from 0 to 15 do               !WRITE 16 WORDS WITH SHIFTED 0 IN A FIELD OF 1'S
18541 ;          8436      begin
18542 ;          8437      IO_BUF [.CNT] = not .TST_PAT;
18543 ;          8438      TST_PAT = .TST_PAT^ONE;
18544 ;          8439      end;
18545 ;          8440
18546 ;          8441  GD_BLK_XFER ();                        !SET UP A GOOD BLOCK XFERR
18547 ;          8442  MLCS1 = write;                         !WRITE SHIFTING PATTERN
18548 ;          8443  TIME_OUT_LOOP;
18549 ;          8444  BGNSUB;
18550 ;          8445
18551 ;          8446  incr CNT from 0 to 15 do               !CLEAR OUT THE IO_BUF
18552 ;          8447      IO_BUF [.CNT] = ZEROES;
18553 ;          8448
18554 ;          8449  CLR_MBUS;
```

```
18556 ;ML4                                                          14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
18557 ;                                                             14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (89)
18558
18559 ;          8450  GD_BLK_XFER ();                              !SET UP A GOOD BLOCK XFERR
18560 ;          8451  ML_CS1 = read;                               !READ SHIFTING PATTERN THROUGH SYNC BUS
18561 ;          8452  TIME_OUT_LOOP;
18562 ;          8453  TST_PAT = ONE;                               !SHIFTING PATTERN
18563 ;          8454
18564 ;          8455  incr CNT from 0 to 15 do                     !READ IO_BUF FOR SHIFTING 0 IN FIELD OF 1'S
18565 ;          8456      begin
18566 ;          8457
18567 ;          8458      if .IO_BUF [.CNT] neq ( not .TST_PAT)    !COMPARE IO_BUF TO SHIFTED PAT
18568 ;          8459      then
18569 ;          8460          begin                                !ERROR AND SET DODU_FLG IF NEQ
18570 ;          8461          ERRDF (93, SYNC, DUMPER);
18571 ;          8462          PRINTB (FIV_FMT, WRD_23, FNC_6, WRD_19, WRD_39, PHR_4);
18572 ;          8463          PRINTB (FMT_2, ( not .TST_PAT), .IO_BUF [.CNT], ( not .TST_PAT xor .IO_BUF [.CNT]));
18573 ;          8464          DODU_FLG = ONE;
18574 ;          8465          end;
18575 ;          8466
18576 ;          8467      TST_PAT = .TST_PAT^ONE;                  !SHIFT THE PATTERN AND REPEAT
18577 ;          8468      end;
18578 ;          8469
18579 ;          8470  ENDSUB;
18580 ;          8471
18581 ;          8472  if .DODU_FLG IS_SET                          !DROP THIS UNIT IF DODU_FLG IS_SET
18582 ;          8473  then
18583 ;          8474      begin
18584 ;          8475      DODU (.ML_LUN);
18585 ;          8476      DOCLN;
18586 ;          8477      end;
18587 ;          8478
18588 ;          8479  ENDTST;
18592
18593                                    .SBTTL  $T39
18597 065066 004167 117024        $T39: JSR     R1,$SAVE5                 ;                          8396
18598 065072 152777 000040 126114       BISB    #40,@ML.REG+40            ;                          8429
18599 065100 016705 126476              MOV     ML.DUT,R5
18600 065104 042705 177770              BIC     #177770,R5
18601 065110 142777 000007 126076       BICB    #7,@ML.REG+40
18602 065116 150577 126072              BISB    R5,@ML.REG+40
18603 065122 005005                     CLR     R5                        ; DODU.FLG                 8432
18604 065124 012704 000001              MOV     #1,R4                     ; *,TST.PAT                8433
18605 065130 005000                     CLR     R0                        ; CNT                      8435
18606 065132 010001                1$:  MOV     R0,R1                     ; CNT,*                    8437
18607 065134 006301                     ASL     R1
18608 065136 010461 011600              MOV     R4,IO.BUF(R1)             ; TST.PAT,*
18609 065142 005161 011600              COM     IO.BUF(R1)
18610 065146 006304                     ASL     R4                        ; TST.PAT                  8438
```

```
18612                          ;ML4                                                    14-May-1981 13:48:54    TOPS
18613                          ;                                                       14-May-1981 13:05:08    PA:<
18614
18615 065150  005200                    INC     R0                      ; CNT                                   8435
18616 065152  020027  000017            CMP     R0,#17                  ; CNT,*
18617 065156  003765                    BLE     1$
18618 065160  004767  130704            JSR     PC,GD.BLK.XFER          ;                                       8441
18619 065164  012777  000061  125762    MOV     #61,@ML.REG             ;                                       8442
18620 065172  105777  126026      2$:   TSTB    @ML.REG+50
18621 065176  100375                    BPL     2$
18622 065200  104402              3$:   TRAP    2                       ;                                       8443
18623 065202  005000                    CLR     R0                      ; CNT                                   8446
18624 065204  010001              4$:   MOV     R0,R1                   ; CNT,*                                 8447
18625 065206  006301                    ASL     R1
18626 065210  005061  011600            CLR     IO.BUF(R1)
18627 065214  005200                    INC     R0                      ; CNT                                   8446
18628 065216  020027  000017            CMP     R0,#17                  ; CNT,*
18629 065222  003770                    BLE     4$
18630 065224  152777  000040  125762    BISB    #40,@ML.REG+40          ;                                       8447
18631 065232  016703  126344            MOV     ML.DUT,R3
18632 065236  042703  177770            BIC     #177770,R3
18633 065242  142777  000007  125744    BICB    #7,@ML.REG+40
18634 065250  150377  125740            BISB    R3,@ML.REG+40
18635 065254  004767  130610            JSR     PC,GD.BLK.XFER          ;                                       8450
18636 065260  012777  000071  125666    MOV     #71,@ML.REG             ;                                       8451
18637 065266  105777  125732      5$:   TSTB    @ML.REG+50
18638 065272  100375                    BPL     5$
18639 065274  012704  000001            MOV     #1,R4                   ; *,TST.PAT                             8453
18640 065300  005002                    CLR     R2                      ; CNT                                   8455
18641 065302  010201              6$:   MOV     R2,R1                   ; CNT,*                                 8458
18642 065304  006301                    ASL     R1
18643 065306  012703  011600            MOV     #IO.BUF,R3
18644 065312  060103                    ADD     R1,R3
18645 065314  010401                    MOV     R4,R1                   ; TST.PAT,*
18646 065316  005101                    COM     R1
18647 065320  021301                    CMP     (R3),R1
18648 065322  001447                    BEQ     7$
18649 065324  104455                    TRAP    55                      ;                                       8461
18650 065326  000135                    .WORD   135
18651 065330  010526                    .WORD   SYNC
18652 065332  024060                    .WORD   DUMPER
18653 065334  012746  007454            MOV     #PHR.4,-(SP)            ;                                       8462
18654 065340  012746  006716            MOV     #WRD.39,-(SP)
18655 065344  012746  006506            MOV     #WRD.19,-(SP)
18656 065350  012746  010004            MOV     #FNC.6,-(SP)
18657 065354  012746  006544            MOV     #WRD.23,-(SP)
18658 065360  012746  006062            MOV     #FIV.FMT,-(SP)
18659 065364  012746  000006            MOV     #6,-(SP)
18660 065370  010600                    MOV     SP,R0                   ; SP,*
18661 065372  104414                    TRAP    14
18662 065374  011316                    MOV     (R3),(SP)               ;                                       8463
18663 065376  010146                    MOV     R1,-(SP)
18664 065400  046616  000002            BIC     2(SP),(SP)
18665 065404  040166  000002            BIC     R1,2(SP)
18666 065410  052616                    BIS     (SP)+,(SP)
```

```
18668                           ;ML4                                                    14-May-1981 13:48:54    TOPS
18669                           ;                                                       14-May-1981 13:05:08    PA:<
18670
18671 065412  011346                     MOV     (R3),-(SP)
18672 065414  010146                     MOV     R1,-(SP)
18673 065416  012746  004266             MOV     #FMT.2,-(SP)
18674 065422  012746  000004             MOV     #4,-(SP)
18675 065426  010600                     MOV     SP,R0                          ; SP,*
18676 065430  104414                     TRAP    14
18677 065432  012705  000001             MOV     #1,R5                          ; *,DODU.FLG                    8464
18678 065436  062706  000026             ADD     #26,SP                         ;                               8460
18679 065442  006304              7$:    ASL     R4                             ; TST.PAT                       8467
18680 065444  005202                     INC     R2                             ; CNT                           8455
18681 065446  020227  000017             CMP     R2,#17                         ; CNT,*
18682 065452  003713                     BLE     6$
18683 065454  104467                     TRAP    67                             ;                               8468
18684 065456  006000                     ROR     R0
18685 065460  103647                     BLO     3$
18686 065462  005305                     DEC     R5                             ; DODU.FLG                      8472
18687 065464  001004                     BNE     8$
18688 065466  016700  126106             MOV     ML.LUN,R0                      ;                               8475
18689 065472  104451                     TRAP    51
18690 065474  104444                     TRAP    44
18691 065476  000207              8$:    RTS     PC                             ;                               8396
18692
18693                           ; Routine Size:  133 words
18694                           ; Maximum stack depth per invocation:  17 words
18699
18700
18704
18705                                   .SBTTL  T39
18709 065500                    T39::
18710 065500  004767  177362      1$:    JSR     PC,$T39                        ;                               8477
18711 065504  104466                     TRAP    66
18712 065506  006000                     ROR     R0
18713 065510  103773                     BLO     1$
18714 065512  000207                     RTS     PC
18715
18716                           ; Routine Size:  6 words
18717                           ; Maximum stack depth per invocation:  0 words
18722 ;         8480  !<BLF/PAGE>
```

```
18724 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
18725 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (90)
18726
18727 ;          8481  !
18728 ;          8482  !
18729 ;          8483  BGNTST;
18730 ;          8484
18731 ;          8485  !++
18732 ;          8486  ! TEST NUMBER:  TST 40
18733 ;          8487  !
18734 ;          8488  ! TEST NAME:    ARRAY ADDRESS MUX TEST
18735 ;          8489  !
18736 ;          8490  ! TEST DESCRIPTION:
18737 ;          8491  !
18738 ;          8492  !       TEST FOR UNIQUE MOS RAM ROW
18739 ;          8493  !       AND COLUMN ADDRESSING BY:
18740 ;          8494  !
18741 ;          8495  !       1.  FIRST FINDING A ERROR FREE
18742 ;          8496  !           16K OR 64K CHUNK OF MEMORY.
18743 ;          8497  !           THIS REPRESENTS ONE ROW OF
18744 ;          8498  !           EITHER 16K OR 64K MOS RAMS.
18745 ;          8499  !
18746 ;          8500  !       2.  WRITE A BACKGROUND OF ALL
18747 ;          8501  !           ONES INTO THE GOOD CHUNK
18748 ;          8502  !
18749 ;          8503  !       3.  WRITE ZEROES INTO THE FIRST
18750 ;          8504  !           BLOCK OF THE GOOD CHUNK.
18751 ;          8505  !
18752 ;          8506  !       4.  READ REMAINING BLOCKS IN
18753 ;          8507  !           GOOD CHUNK FOR ONES.
18754 ;          8508  !
18755 ;          8509  !
18756 ;          8510  ! IMPLICIT INPUTS:
18757 ;          8511  !
18758 ;          8512  !       IO_BUF
18759 ;          8513  !
18760 ;          8514  !       A VECTOR OF 256 WORDS
18761 ;          8515  !       WHERE DATA FOR MBUS
18762 ;          8516  !       READ AND WRITE TRANSFERS
18763 ;          8517  !       CAN BE FOUND.
18764 ;          8518  !--
18765 ;          8519
18766 ;          8520  local
18767 ;          8521      DSA_ADRS,                       !DSA ADRS COUNTER
18768 ;          8522      FND_GD_CHK;                     !FOUND GOOD 16K/64K CHUNK FLAG
18769 ;          8523
18770 ;          8524  IO_BUF = ONES;                      !LOAD FIRST IO_BUF WORD WITH ONES
18771 ;          8525  DSA_ADRS = -.RAS_INC;               !REST DSA COUNT
18772 ;          8526  FND_GD_CHK = ZERO;                  !CLEAR FLAG
18773 ;          8527
18774 ;          8528  do                                  !DO UNTIL FOUND GOOD CHUNK OR LBT
18775 ;          8529      begin
18776 ;          8530      CLR_MBUS;
18777 ;          8531      BAI = ONE;                      !SET ON FIRST IO BUF WORD
18778 ;          8532      ECC_DIS = ONE;                  !DISABLE ECC
```

```
;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (90)

;          8533      DSA_ADRS = .DSA_ADRS + .RAS_INC;                !INCREMENT DSA ADRS COUNTER
;          8534      MLWC = .W_C_SIZE;                               !16K OR 64K WORDS
;          8535      MLBA = IO_BUF;                                  !LOAD UBUS ADRS
;          8536      MLDA = .DSA_ADRS;                               !LOAD DSA ADRS
;          8537      ML_FUNC = write;                                !DO A WRITE FUNCTION
;          8538      TIME_OUT_LOOP;
;          8539
;          8540      if .SC IS_NOT_SET                               !DID XFERR CAUSE AN SC
;          8541      then
;          8542          begin                                       !XFERR WAS OK
;          8543          MLWC = .W_C_SIZE;                           !LOAD WORD COUNT
;          8544          MLBA = IO_BUF;                              !LOAD UBUS ADRS
;          8545          MLDA = .DSA_ADRS;                           !LOAD DSA ADRS
;          8546          ML_FUNC = WRT_CHK;                          !DO A WRITE CHECK FUNCTION
;          8547          TIME_OUT_LOOP;
;          8548
;          8549          if .SC IS_NOT_SET                           !IS THIS CHUNK GOOD
;          8550          then
;          8551              FND_GD_CHK = ONE;                       !YES SET FLG
;          8552
;          8553          end
;          8554
;          8555      end
;          8556  until (.FND_GD_CHK IS_SET ) or (.DSA_ADRS eql .LST_ARR + .ARR_INC);
;          8557
;          8558                                                      !REPEAT UNTIL FOUND GOOD CHUNCK OR AT LBT
;          8559
;          8560  if .DSA_ADRS eql .LST_ARR + .ARR_INC
;          8561  then
;          8562      begin
;          8563      ERRDF (111, INTER, DUMPER);
;          8564      PRINTB (FIV_FMT, FNC_13, FNC_17, WRD_50, WRD_60, WRD_56);
;          8565      PRINTB (THR_FMT, WRD_14, PHR_10, FNC_15);
;          8566      DODU (.ML_LUN);
;          8567      DOCLN;
;          8568      end
;          8569  else                                                !A GOOD CHUNCK WAS FOUND CONTINUE TEST
;          8570      begin
;          8571      CLR_MBUS;
;          8572      BAI = ONE;
;          8573      ECC_DIS = ONE;                                  !DISABLE ECC
;          8574      IO_BUF = ZEROES;                                !FIRST BLOCK IN CHUNCK GETS ZEROES
;          8575      MLDA = .DSA_ADRS;                               !LOAD DSA
;          8576      MLWC = not 255;                                 !LOAD WORD COUNT
;          8577      MLBA = IO_BUF;                                  !LOAD UBUS ADRS
;          8578      ML_FUNC = write;                                !DO A WRITE FUNCTION
;          8579      TIME_OUT_LOOP;
;          8580      CLR_MBUS;
;          8581      BAI = ONE;
;          8582      IO_BUF = ONES;                                  !READ REMAINING BLOCKS FOR ONES
;          8583      ECC_DIS = ONE;
;          8584      MLDA = .DSA_ADRS + 1;                           !LOAD DSA WITH NEXT DSA INCREMENT
```

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18836 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
18837 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (90)
18838
18839 ;          8585      MLBA = IO_BUF;                     !LOAD  UBUS ADRS
18840 ;          8586      MLWC = .W_C_SIZE + 256;            !LOAD WORD COUNT WITH LESS ONE BLOCK
18841 ;          8587      ML_FUNC = WRT_CHK;                 !DO A WRITE CHECK FUNCTION
18842 ;          8588      TIME_OUT_LOOP;
18843 ;          8589
18844 ;          8590      if .WCE IS_SET                     !WERE ANY BITS DISTURBED
18845 ;          8591      then
18846 ;          8592          begin                          !ERROR IF WRITE CHECK FOUND BAD DATA
18847 ;          8593          ERRDF (112, ASYNC, DUMPER);
18848 ;          8594          PRINTB (FOR_FMT, FNC_17, WRD_50, WRD_60, WRD_14);
18849 ;          8595          PRINTB (FMT_9, (.MLDA - 1));
18850 ;          8596          DODU (.ML_LUN);
18851 ;          8597          DOCLN;
18852 ;          8598          end;
18853 ;          8599
18854 ;          8600      end;
18855 ;          8601
18856 ;          8602  ENDTST;
18860
18861                                    .SBTTL  $T40
18865 065514  004167  116324          $T40:  JSR     R1,$SAVE2                ;                              8479
18866 065520  012767  177777  124052          MOV     #-1,IO.BUF               ;                              8524
18867 065526  016702  125372                  MOV     RAS.INC,R2               ; *,DSA.ADRS                   8525
18868 065532  005402                          NEG     R2                       ; DSA.ADRS
18869 065534  005000                          CLR     R0                       ; FND.GD.CHK                   8526
18870 065536  152777  000040  125450    1$:   BISB    #40,@ML.REG+40           ;                              8529
18871 065544  016701  126032                  MOV     ML.DUT,R1
18872 065550  042701  177770                  BIC     #177770,R1
18873 065554  142777  000007  125432          BICB    #7,@ML.REG+40
18874 065562  150177  125426                  BISB    R1,@ML.REG+40
18875 065566  152777  000010  125420          BISB    #10,@ML.REG+40           ;                              8531
18876 065574  152777  000002  125472          BISB    #2,@ML.REG+120           ;                              8532
18877 065602  066702  125316                  ADD     RAS.INC,R2               ; *,DSA.ADRS                   8533
18878 065606  016777  125310  125350          MOV     W.C.SIZE,@ML.REG+10      ;                              8534
18879 065614  012777  011600  125352          MOV     #IO.BUF,@ML.REG+20       ;                              8535
18880 065622  010277  125356                  MOV     R2,@ML.REG+30            ; DSA.ADRS,*                   8536
18881 065626  142777  000077  125320          BICB    #77,@ML.REG              ;                              8537
18882 065634  152777  000061  125312          BISB    #61,@ML.REG
18883 065642  105777  125356          2$:     TSTB    @ML.REG+50
18884 065646  100375                          BPL     2$
18885 065650  032777  100000  125276          BIT     #100000,@ML.REG          ;                              8540
18886 065656  001027                          BNE     4$
18887 065660  016777  125236  125276          MOV     W.C.SIZE,@ML.REG+10      ;                              8543
18888 065666  012777  011600  125300          MOV     #IO.BUF,@ML.REG+20       ;                              8544
18889 065674  010277  125304                  MOV     R2,@ML.REG+30            ; DSA.ADRS,*                   8545
18890 065700  142777  000077  125246          BICB    #77,@ML.REG              ;                              8546
```

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                                        ;ML4                                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                                       14-May-1981 13:05:08    PA:<
18892
18893 065706  152777  000051  125240          BISB    #51,@ML.REG
18894 065714  105777  125304          3$:     TSTB    @ML.REG+50
18895 065720  100375                  BPL     3$
18896 065722  032777  100000  125224          BIT     #100000,@ML.REG         ;                               8549
18897 065730  001002                  BNE     4$
18898 065732  012700  000001          MOV     #1,R0                   ; *,FND.GD.CHK                          8551
18899 065736  020027  000001          4$:     CMP     R0,#1                   ; FND.GD.CHK,*                  8556
18900 065742  001406                  BEQ     5$
18901 065744  016701  123626          MOV     LST.ARR,R1
18902 065750  066701  123606          ADD     ARR.INC,R1
18903 065754  020201                  CMP     R2,R1                   ; DSA.ADRS,*
18904 065756  001267                  BNE     1$
18905 065760  016701  123612          5$:     MOV     LST.ARR,R1              ;                               8560
18906 065764  066701  123572          ADD     ARR.INC,R1
18907 065770  020201                  CMP     R2,R1                   ; DSA.ADRS,*
18908 065772  001047                  BNE     6$
18909 065774  104455                  TRAP    55                      ;                               8563
18910 065776  000157                  .WORD   157
18911 066000  010672                  .WORD   INTER
18912 066002  024060                  .WORD   DUMPER
18913 066004  012746  007122          MOV     #WRD.56,-(SP)           ;                               8564
18914 066010  012746  007156          MOV     #WRD.60,-(SP)
18915 066014  012746  007046          MOV     #WRD.50,-(SP)
18916 066020  012746  010162          MOV     #FNC.17,-(SP)
18917 066024  012746  010112          MOV     #FNC.13,-(SP)
18918 066030  012746  006062          MOV     #FIV.FMT,-(SP)
18919 066034  012746  000006          MOV     #6,-(SP)
18920 066040  010600                  MOV     SP,R0                   ; SP,*
18921 066042  104414                  TRAP    14
18922 066044  012716  010136          MOV     #FNC.15,(SP)            ;                               8565
18923 066050  012746  007564          MOV     #PHR.10,-(SP)
18924 066054  012746  006442          MOV     #WRD.14,-(SP)
18925 066060  012746  006034          MOV     #THR.FMT,-(SP)
18926 066064  012746  000004          MOV     #4,-(SP)
18927 066070  010600                  MOV     SP,R0                   ; SP,*
18928 066072  104414                  TRAP    14
18929 066074  016700  125500          MOV     ML.LUN,R0               ;                               8566
18930 066100  104451                  TRAP    51
18931 066102  104444                  TRAP    44
18932 066104  062706  000026          ADD     #26,SP                  ;                               8562
18933 066110  000207                  RTS     PC                      ;                               8560
18934 066112  152777  000040  125074  6$:     BISB    #40,@ML.REG+40          ;                               8570
18935 066120  016701  125456          MOV     ML.DUT,R1
18936 066124  042701  177770          BIC     #177770,R1
18937 066130  142777  000007  125056          BICB    #7,@ML.REG+40
18938 066136  150177  125052          BISB    R1,@ML.REG+40
18939 066142  152777  000010  125044          BISB    #10,@ML.REG+40          ;                               8572
18940 066150  152777  000002  125116          BISB    #2,@ML.REG+120          ;                               8573
18941 066156  005067  123416          CLR     IO.BUF                  ;                               8574
18942 066162  010277  125016          MOV     R2,@ML.REG+30           ; DSA.ADRS,*                    8575
18943 066166  012777  177400  124770          MOV     #-400,@ML.REG+10        ;                               8576
18944 066174  012777  011600  124772          MOV     #IO.BUF,@ML.REG+20      ;                               8577
```

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18948                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
18949                                   ;                                                       14-May-1981 13:05:08    PA:<
18950
18951 066202 142777 000077 124744       BICB    #77,@ML.REG                     ;                                       8578
18952 066210 152777 000061 124736       BISB    #61,@ML.REG
18953 066216 105777 125002          7$: TSTB    @ML.REG+50
18954 066222 100375                     BPL     7$
18955 066224 152777 000040 124762       BISB    #40,@ML.REG+40                  ;                                       8579
18956 066232 016701 125344              MOV     ML.DUT,R1
18957 066236 042701 177770              BIC     #177770,R1
18958 066242 142777 000007 124744       BICB    #7,@ML.REG+40
18959 066250 150177 124740              BISB    R1,@ML.REG+40
18960 066254 152777 000010 124732       BISB    #10,@ML.REG+40                  ;                                       8581
18961 066262 012767 177777 123310       MOV     #-1,IO.BUF                      ;                                       8582
18962 066270 152777 000002 124776       BISB    #2,@ML.REG+120                  ;                                       8583
18963 066276 010201                     MOV     R2,R1                           ; DSA.ADRS,*                            8584
18964 066300 005201                     INC     R1
18965 066302 010177 124676              MOV     R1,@ML.REG+30
18966 066306 012777 011600 124660       MOV     #IO.BUF,@ML.REG+20              ;                                       8585
18967 066314 016702 124602              MOV     W.C.SIZE,R2                     ;                                       8586
18968 066320 062702 000400              ADD     #400,R2
18969 066324 010277 124634              MOV     R2,@ML.REG+10
18970 066330 142777 000077 124616       BICB    #77,@ML.REG                     ;                                       8587
18971 066336 152777 000051 124610       BISB    #51,@ML.REG
18972 066344 105777 124654          8$: TSTB    @ML.REG+50
18973 066350 100375                     BPL     8$
18974 066352 032777 040000 124634       BIT     #40000,@ML.REG+40               ;                                       8590
18975 066360 001441                     BEQ     9$
18976 066362 104455                     TRAP    55                              ;                                       8593
18977 066364 000160                     .WORD   160
18978 066366 010464                     .WORD   ASYNC
18979 066370 024060                     .WORD   DUMPER
18980 066372 012746 006442              MOV     #WRD.14,-(SP)                   ;                                       8594
18981 066376 012746 007156              MOV     #WRD.60,-(SP)
18982 066402 012746 007046              MOV     #WRD.50,-(SP)
18983 066406 012746 010162              MOV     #FNC.17,-(SP)
18984 066412 012746 006046              MOV     #FOR.FMT,-(SP)
18985 066416 012746 000005              MOV     #5,-(SP)
18986 066422 010600                     MOV     SP,R0                           ; SP,*
18987 066424 104414                     TRAP    14
18988 066426 017716 124552              MOV     @ML.REG+30,(SP)                 ;                                       8595
18989 066432 005316                     DEC     (SP)
18990 066434 012746 004644              MOV     #FMT.9,-(SP)
18991 066440 012746 000002              MOV     #2,-(SP)
18992 066444 010600                     MOV     SP,R0                           ; SP,*
18993 066446 104414                     TRAP    14
18994 066450 016700 125124              MOV     ML.LUN,R0                       ;                                       8596
18995 066454 104451                     TRAP    51
18996 066456 104444                     TRAP    44
18997 066460 062706 000020              ADD     #20,SP                          ;                                       8592
18998 066464 000207                 9$: RTS     PC                              ;                                       8479
18999
19000                                   ; Routine Size:  245 words
19001                                   ; Maximum stack depth per invocation:  14 words
```

```
 19010
 19011
 19015
 19016                                          .SBTTL  T40
 19020 066466                           T40::
 19021 066466  004767  177022           1$:     JSR     PC,$T40                 ;                8600
 19022 066472  104466                           TRAP    66
 19023 066474  006000                           ROR     R0
 19024 066476  103773                           BLO     1$
 19025 066500  000207                           RTS     PC
 19026
 19027                                  ; Routine Size:  6 words
 19028                                  ; Maximum stack depth per invocation:  0 words
 19033
 19034
 19035 ;          8603  !<BLF/PAGE>
```

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19037 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
19038 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (91)
19039
19040 ;          8604  !
19041 ;          8605  BGNTST;
19042 ;          8606
19043 ;          8607  !++
19044 ;          8608  ! TEST NUMBER:  TST 41
19045 ;          8609  !
19046 ;          8610  ! TEST NAME:    NIBBLE OFFSET TEST
19047 ;          8611  !
19048 ;          8612  ! TEST DESCRIPTION:
19049 ;          8613  !       TEST NIBBLE OFFSET COUNTERS TO OFFSET GOOD NIBBLE DATA A MAX
19050 ;          8614  !       OF 14 WORDS ON DETECTION OF ALL BAD NIBBLES BY:
19051 ;          8615  !
19052 ;          8616  !       1.  LOADING FIRST 2 1/4 WORDS OF THE IO_BUF WITH ZEROES AND THE
19053 ;          8617  !           REMAINING OF BUFFER WITH ONES.
19054 ;          8618  !
19055 ;          8619  !       2.  VIA DAT_DM MODE WRITE THE GOOD BLOCK WITH BACKGROUND
19056 ;          8620  !           ON ONES.
19057 ;          8621  !
19058 ;          8622  !       3.  VIA PROM R/W MODE FORCE ALL ARRAY NIBBLES BAD.
19059 ;          8623  !
19060 ;          8624  !       4.  VIA A MBUS WRITE FUNCTION LOAD IO_BUF INTO THE GOOD BLOCK.
19061 ;          8625  !
19062 ;          8626  !       5.  VIA DAT_DM MODE READ FIRST 15 ARRAY WORDS FOR ZEROES AND THE
19063 ;          8627  !           REMAINING WORDS FOR ONES.
19064 ;          8628  !
19065 ;          8629  ! IMPLICIT INPUTS:
19066 ;          8630  !       PD_TEMP
19067 ;          8631  !       A BIT VECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND
19068 ;          8632  !       ACCESSED FROM.
19069 ;          8633  !
19070 ;          8634  !       IO_BUF
19071 ;          8635  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
19072 ;          8636  !       FUNCTIONS ARE FOUND.
19073 ;          8637  !--
19074 ;          8638
19075 ;          8639  local
19076 ;          8640      DODU_FLG,                          !DROP UNIT FLAG
19077 ;          8641      TST_PAT,                           !TEST PATTERN
19078 ;          8642      START,                             !STARTING WORD
19079 ;          8643      FINISH,                            !ENDING WORD
19080 ;          8644      ERR_FLG;                           !ERROR FLAG
19081 ;          8645
19082 ;          8646  BGNSUB;
19083 ;          8647  CLR_MBUS;
19084 ;          8648  DODU_FLG = ZERO;
19085 ;          8649
19086 ;          8650  incr WD_CNT from 0 to 255 do           !LOAD IO_BUF WITH ONES
19087 ;          8651      IO_BUF [.WD_CNT] = ONES;
19088 ;          8652
19089 ;          8653  IO_BUF [0] = ZEROES;                   !LOAD FIRST 2 1/4 WORDS WITH ZEROES
19090 ;          8654  IO_BUF [1] = ZEROES;
19091 ;          8655  IO_BUF [2] = %o'177760';
19092 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
19093 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (91)
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```
19094
19095 ;          8656  MLD1 = ONES;                                  !LOAD DATA DIAG REGISTERS WITH ONES
19096 ;          8657  MLD2 = ONES;
19097 ;          8658  MLE2 = ONES;
19098 ;          8659  DAT_DM_XFER ();                               !SET UP A DATA DIAG MODE XFERR
19099 ;          8660  MLCS1 = write;                                !DO A WRITE XFERR
19100 ;          8661
19101 ;          8662  incr WD_CNT from 0 to 127 do                  !LOAD BLOCK WITH BG PAT
19102 ;          8663      begin
19103 ;          8664      DELAY (ONE_US);
19104 ;          8665      DAT_CLK = ONE;
19105 ;          8666      end;
19106 ;          8667
19107 ;          8668  CLR_MBUS;
19108 ;          8669  WRT_PD (ONES, 19);                            !FORCE ALL NIBBLES BAD
19109 ;          8670  PROM_RW = ONE;                                !SET PROM READ WRITE
19110 ;          8671  GD_BLK_XFER ();                               !SET UP A GOOD BLOCK XFERR
19111 ;          8672  MLCS1 = write;                                !WRITE ZEROES IN FIRST BLOCK WORD LOCATION
19112 ;          8673                                                !OFFSETTING 14 NIBBLES WITH ZEROES ALSO.
19113 ;          8674  TIME_OUT_LOOP;
19114 ;          8675  CLR_MBUS;
19115 ;          8676  START = ZERO;                                 !START AT THE FIRST BLOCK WORD
19116 ;          8677  FINISH = 14;                                  !END AT THE 14'TH BLOCK WORD
19117 ;          8678  TST_PAT = ZEROES;                             !TEST FOR ZEROES IN FIRST 14 WORDS
19118 ;          8679  DAT_DM_XFER ();                               !SET UP A DATA DIAG MODE XFERR
19119 ;          8680  MLCS1 = read;                                 !DO A READ FUNCTION
19120 ;          8681  DELAY (ONE_US);
19121 ;          8682
19122 ;          8683  incr TWICE from 0 to 1 do                     !READ WORDS 0-14 FOR 0'S AND 15-126 FOR 1'S
19123 ;          8684      begin
19124 ;          8685
19125 ;          8686      incr WRD_CNT from .START to .FINISH do     !READ BLOCK WORDS FORM START TO FINISH
19126 ;          8687          begin
19127 ;          8688          PD_TEMP = .MLPD;                       !GET PROM DATA
19128 ;          8689          DAT_CLK = ONE;                         !CLOCK OUT THE DATA WORD
19129 ;          8690          DELAY (ONE_US);
19130 ;          8691          RD_LNG_WRD;                            !READ THE DATA DIAG REGISTERS
19131 ;          8692
19132 ;          8693          incr NIB_PTR from 0 to 8 do            !LOOK AT 9 NIBBLES
19133 ;          8694
19134 ;          8695              if .PD_TEMP [.NIB_PTR] IS_NOT_SET  !FIND GOOD NIBBLES
19135 ;          8696              then
19136 ;          8697                  begin
19137 ;          8698                  TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);      !COMPARE NIBBLE WITH TST PAT
19138 ;          8699
19139 ;          8700                  if .ERR_FLG IS_SET              !SEE IF COMPARE FOUND AN ERROR
19140 ;          8701                  then
19141 ;          8702                      begin                       !ERROR AND SET DODU_FLG IF ERROR FLG SET
19142 ;          8703                      ERRDF (94, ARR_DAT, DUMPER);
19143 ;          8704                      PRINTB (THR_FMT, WRD_41, WRD_46, WRD_10);
19144 ;          8705                      PRINTB (FMT_6, .NIB_PTR);
19145 ;          8706                      DODU_FLG = ONE;
19146 ;          8707                      end;
19147 ;ML4                                                  14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
19148 ;                                                     14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (91)
19149
19150 ;          8708
```

```
19151 ;          8709                    end;
19152 ;          8710
19153 ;          8711                end;
19154 ;          8712
19155 ;          8713            TST_PAT = not .TST_PAT;                 !NOW READ FOR ONES
19156 ;          8714            START = 15;                             !START A 15
19157 ;          8715            FINISH = 126;                           !END AT 126
19158 ;          8716            end
19159 ;          8717
19160 ;          8718        ENDSUB;
19161 ;          8719
19162 ;          8720        if .DODU_FLG IS_SET                         !DROP THIS UNIT IF DODU_FLG SET
19163 ;          8721        then
19164 ;          8722            begin
19165 ;          8723            DODU (.ML_LUN);
19166 ;          8724            DOCLN;
19167 ;          8725            end;
19168 ;          8726
19169 ;          8727        ENDTST;
19173
19174                                        .SBTTL  $T41
19178 066502  004167  115410          $T41: JSR     R1,$SAVE5                 ;                    8602
19179 066506  162706  000012                SUB     #12,SP
19180 066512  104402                  1$:   TRAP    2                         ;                    8644
19181 066514  152777  000040  124472        BISB    #40,@ML.REG+40            ;                    8646
19182 066522  016704  125054                MOV     ML.DUT,R4
19183 066526  042704  177770                BIC     #177770,R4
19184 066532  142777  000007  124454        BICB    #7,@ML.REG+40
19185 066540  150477  124450                BISB    R4,@ML.REG+40
19186 066544  005066  000004                CLR     4(SP)                     ; DODU.FLG           8648
19187 066550  005002                        CLR     R2                        ; WD.CNT             8650
19188 066552  010203                2$:     MOV     R2,R3                     ; WD.CNT,*           8651
19189 066554  006303                        ASL     R3
19190 066556  012763  177777  011600        MOV     #-1,IO.BUF(R3)
19191 066564  005202                        INC     R2                        ; WD.CNT             8650
19192 066566  020227  000377                CMP     R2,#377                   ; WD.CNT,*
19193 066572  003767                        BLE     2$
19194 066574  005067  123000                CLR     IO.BUF                    ;                    8653
19195 066600  005067  122776                CLR     IO.BUF+2                  ;                    8654
19196 066604  012767  177760  122772        MOV     #-20,IO.BUF+4             ;                    8655
19197 066612  012777  177777  124524        MOV     #-1,@ML.REG+170           ;                    8656
19198 066620  012777  177777  124526        MOV     #-1,@ML.REG+200           ;                    8657
19199 066626  012777  177777  124500        MOV     #-1,@ML.REG+160           ;                    8658
19200 066634  004767  125322                JSR     PC,DAT.DM.XFER            ;                    8659
19201 066640  012777  000061  124306        MOV     #61,@ML.REG               ;                    8660
19202                               ;ML4                                                 14-May-1981 13:48:54  TOPS
19203                               ;                                                    14-May-1981 13:05:08  PA:<
19204
19205 066646  005001                        CLR     R1                        ; WD.CNT             8662
19206 066650  012702  000001          3$:   MOV     #1,R2                     ; *,$$TMP2           8664
19207 066654  001411                4$:   BEQ     7$
19208 066656  016703  113234              MOV     L$DLY,R3                  ; *,$$TMP1
19209 066662  001404                      BEQ     6$
19210 066664  005066  000010          5$:   CLR     10(SP)                    ; $$TMP
19211 066670  005303                      DEC     R3                        ; $$TMP1
19212 066672  001374                      BNE     5$
19213 066674  005302                6$:   DEC     R2                        ; $$TMP2
```

```
19214 066676 000766                    BR      4$
19215 066700 152777 000020 124366 7$:  BISB    #20,@ML.REG+120          ;                                  8665
19216 066706 005201                    INC     R1                       ; WD.CNT                           8662
19217 066710 020127 000177             CMP     R1,#177                  ; WD.CNT,*
19218 066714 003755                    BLE     3$
19219 066716 152777 000040 124270      BISB    #40,@ML.REG+40           ;                                  8666
19220 066724 016704 124652             MOV     ML.DUT,R4
19221 066730 042704 177770             BIC     #177770,R4
19222 066734 142777 000007 124252      BICB    #7,@ML.REG+40
19223 066742 150477 124246             BISB    R4,@ML.REG+40
19224 066746 012746 177777             MOV     #-1,-(SP)                ;                                  8669
19225 066752 012746 000023             MOV     #23,-(SP)
19226 066756 004767 132244             JSR     PC,WRT.PD
19227 066762 152777 000100 124304      BISB    #100,@ML.REG+120         ;                                  8670
19228 066770 004767 127074             JSR     PC,GD.BLK.XFER           ;                                  8671
19229 066774 012777 000061 124152      MOV     #61,@ML.REG              ;                                  8672
19230 067002 105777 124216       8$:   TSTB    @ML.REG+50
19231 067006 100375                    BPL     8$
19232 067010 152777 000040 124176      BISB    #40,@ML.REG+40           ;                                  8674
19233 067016 016704 124560             MOV     ML.DUT,R4
19234 067022 042704 177770             BIC     #177770,R4
19235 067026 142777 000007 124160      BICB    #7,@ML.REG+40
19236 067034 150477 124154             BISB    R4,@ML.REG+40
19237 067040 005066 000006             CLR     6(SP)                    ; START                            8676
19238 067044 012766 000016 000004      MOV     #16,4(SP)                ; *,FINISH                         8677
19239 067052 005005                    CLR     R5                       ; TST.PAT                          8678
19240 067054 004767 125102             JSR     PC,DAT.DM.XFER           ;                                  8679
19241 067060 012777 000071 124066      MOV     #71,@ML.REG              ;                                  8680
19242 067066 012702 000001             MOV     #1,R2                    ; *,$$TMP2                         8681
19243 067072 001411              9$:   BEQ     12$
19244 067074 016703 113016             MOV     L$DLY,R3                 ; *,$$TMP1
19245 067100 001404                    BEQ     11$
19246 067102 005066 000014       10$:  CLR     14(SP)                   ; $$TMP
19247 067106 005303                    DEC     R3                       ; $$TMP1
19248 067110 001374                    BNE     10$
19249 067112 005302              11$:  DEC     R2                       ; $$TMP2
19250 067114 000766                    BR      9$
19251 067116 005004              12$:  CLR     R4                       ; TWICE                            8683
19252 067120 016601 000006       13$:  MOV     6(SP),R1                 ; START,WRD.CNT                    8686
19253 067124 005301                    DEC     R1                       ; WRD.CNT
19254 067126 000534                    BR      22$
19255 067130 017767 124250 123762 14$: MOV     @ML.REG+230,PD.TEMP      ;                                  8688
19256 067136 152777 000020 124130      BISB    #20,@ML.REG+120          ;                                  8689
19257                            ;ML4                                                  14-May-1981 13:48:54  TOPS
19258                            ;                                                     14-May-1981 13:05:08  PA:<
19259
19260 067144 012702 000001             MOV     #1,R2                    ; *,$$TMP2                         8690
19261 067150 001411              15$:  BEQ     18$
19262 067152 016703 112740             MOV     L$DLY,R3                 ; *,$$TMP1
19263 067156 001404                    BEQ     17$
19264 067160 005066 000014       16$:  CLR     14(SP)                   ; $$TMP
19265 067164 005303                    DEC     R3                       ; $$TMP1
19266 067166 001374                    BNE     16$
19267 067170 005302              17$:  DEC     R2                       ; $$TMP2
19268 067172 000766                    BR      15$
19269 067174 017767 124144 121750 18$: MOV     @ML.REG+170,D1.TEMP
19270 067202 017767 124146 121744      MOV     @ML.REG+200,D2.TEMP
```

```
19271 067210  017767  124120  121740          MOV     @ML.REG+160,E2.TEMP
19272 067216  005002                          CLR     R2                      ; NIB.PTR                       8693
19273 067220  010203                  19$:    MOV     R2,R3                   ; NIB.PTR,*                     8695
19274 067222  006203                          ASR     R3
19275 067224  006203                          ASR     R3
19276 067226  006203                          ASR     R3
19277 067230  062703  013120                  ADD     #PD.TEMP,R3
19278 067234  010346                          MOV     R3,-(SP)
19279 067236  010246                          MOV     R2,-(SP)                ; NIB.PTR,*
19280 067240  042716  177770                  BIC     #177770,(SP)
19281 067244  012746  000001                  MOV     #1,-(SP)
19282 067250  005046                          CLR     -(SP)
19283 067252  004767  113662                  JSR     PC,BL$GT2
19284 067256  062706  000010                  ADD     #10,SP
19285 067262  005700                          TST     R0
19286 067264  001051                          BNE     21$
19287 067266  010246                          MOV     R2,-(SP)                ; NIB.PTR,*                     8698
19288 067270  010546                          MOV     R5,-(SP)                ; TST.PAT,*
19289 067272  012746  000020                  MOV     #20,-(SP)
19290 067276  060616                          ADD     SP,(SP)                 ; ERR.FLG,*
19291 067300  004767  126650                  JSR     PC,TST.LNG.WRD
19292 067304  026627  000020  000001          CMP     20(SP),#1               ; ERR.FLG,*                     8700
19293 067312  001034                          BNE     20$
19294 067314  104455                          TRAP    55                      ;                               8703
19295 067316  000136                          .WORD   136
19296 067320  010570                          .WORD   ARR.DAT
19297 067322  024060                          .WORD   DUMPER
19298 067324  012746  006406                  MOV     #WRD.10,-(SP)           ;                               8704
19299 067330  012746  007004                  MOV     #WRD.46,-(SP)
19300 067334  012746  006732                  MOV     #WRD.41,-(SP)
19301 067340  012746  006034                  MOV     #THR.FMT,-(SP)
19302 067344  012746  000004                  MOV     #4,-(SP)
19303 067350  010600                          MOV     SP,R0                   ; SP,*
19304 067352  104414                          TRAP    14
19305 067354  010216                          MOV     R2,(SP)                 ; NIB.PTR,*                     8705
19306 067356  012746  004532                  MOV     #FMT.6,-(SP)
19307 067362  012746  000002                  MOV     #2,-(SP)
19308 067366  010600                          MOV     SP,R0                   ; SP,*
19309 067370  104414                          TRAP    14
19310 067372  012766  000001  000034          MOV     #1,34(SP)               ; *,DODU.FLG                    8706
19311 067400  062706  000016                  ADD     #16,SP                  ;                               8702
19312                               ;ML4                                                14-May-1981 13:48:54    TOPS
19313                               ;                                                   14-May-1981 13:05:08    PA:<
19314
19315 067404  062706  000006          20$:    ADD     #6,SP                   ;                               8697
19316 067410  005202                  21$:    INC     R2                      ; NIB.PTR                       8693
19317 067412  020227  000010                  CMP     R2,#10                  ; NIB.PTR,*
19318 067416  003700                          BLE     19$
19319 067420  005201                  22$:    INC     R1                      ; WRD.CNT                       8686
19320 067422  020166  000004                  CMP     R1,4(SP)                ; WRD.CNT,FINISH
19321 067426  003640                          BLE     14$
19322 067430  005105                          COM     R5                      ; TST.PAT                       8713
19323 067432  012766  000017  000006          MOV     #17,6(SP)               ; *,START                       8714
19324 067440  012766  000176  000004          MOV     #176,4(SP)              ; *,FINISH                      8715
19325 067446  005204                          INC     R4                      ; TWICE                         8683
19326 067450  020427  000001                  CMP     R4,#1                   ; TWICE,*
19327 067454  003621                          BLE     13$
```

```
19328 067456  022626                        CMP     (SP)+,(SP)+                     ;                                8644
19329 067460  104467                        TRAP    67                              ;                                8716
19330 067462  006000                        ROR     R0
19331 067464  103002                        BHIS    23$
19332 067466  000167  177020               JMP     1$
19333 067472  026627  000004  000001  23$:  CMP     4(SP),#1                        ; DODU.FLG,*                     8720
19334 067500  001004                        BNE     24$
19335 067502  016700  124072               MOV     ML.LUN,R0                       ;                                8723
19336 067506  104451                        TRAP    51
19337 067510  104444                        TRAP    44
19338 067512  062706  000012          24$:  ADD     #12,SP                          ;                                8602
19339 067516  000207                        RTS     PC
19340
19341                                 ; Routine Size:  263 words
19342                                 ; Maximum stack depth per invocation:  23 words
19347
19348
19352
19353                                         .SBTTL  T41
19357 067520                          T41::
19358 067520  004767  176756          1$:     JSR     PC,$T41                         ;                                8725
19359 067524  104466                        TRAP    66
19360 067526  006000                        ROR     R0
19361 067530  103773                        BLO     1$
19362 067532  000207                        RTS     PC
19363
19364                                 ; Routine Size:  6 words
19365                                 ; Maximum stack depth per invocation:  0 words
19373
19374
19375 ;          8728  !<BLF/PAGE>
```

```
19377 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
19378 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (92)
19379
19380 ;          8729  !
19381 ;          8730  BGNTST;
19382 ;          8731
19383 ;          8732  !++
19384 ;          8733  ! TEST NUMBER:  TST 42
19385 ;          8734  !
19386 ;          8735  ! TEST NAME:    CS1 FUNCTION ABORT TEST
19387 ;          8736  !
19388 ;          8737  ! TEST DESCRIPTION:
19389 ;          8738  !       TEST CS1 FUNCTION ABORTS ON DETECTION OF CLASS 'A' & 'B' ERRORS BY:
19390 ;          8739  !
19391 ;          8740  !       1.  VIA MBUS WRITE FUNCTION LOAD THE GOOD BLOCK WITH BACKGROUND
19392 ;          8741  !           PATTERN OF ONES.
19393 ;          8742  !
19394 ;          8743  !       2.  CLEAR THE IO_BUF
19395 ;          8744  !
19396 ;          8745  !       3.  DO A MBUS READ FUNCTION.  WHILE THE READ IS IN PROGRESS WRITE TO
19397 ;          8746  !           MLDA (CLASS 'A' ERROR) READ THE IO_BUF FOR ONES.
19398 ;          8747  !
19399 ;          8748  !       4.  CLEAR THE IO_BUF
19400 ;          8749  !
19401 ;          8750  !       5.  VIA PROM R/W MODE FORCE UV ERROR TO THE UV ADRS ERROR PROM
19402 ;          8751  !           (CLASS 'B' ERROR).  DO A MBUS READ.
19403 ;          8752  !
19404 ;          8753  !       6.  READ IO_BUF FOR ZEROES
19405 ;          8754  !
19406 ;          8755  ! IMPLICIT INPUTS:
19407 ;          8756  !       IO_BUF
19408 ;          8757  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND
19409 ;          8758  !       WRITE FUNCTION ARE FOUND.
19410 ;          8759  !--
19411 ;          8760
19412 ;          8761  CLR_MBUS;
19413 ;          8762  BAI = ONE;                                  !SET ON FIRST IO_BUF ADRS
19414 ;          8763  IO_BUF = ONES;                              !LOAD FIRST IO_BUF ADRS
19415 ;          8764  GD_BLK_XFER ();                             !SET UP A GOOD BLOCK XFERR
19416 ;          8765  MLCS1 = write;                              !WRITE BACKGROUND PATTERN
19417 ;          8766  TIME_OUT_LOOP;
19418 ;          8767
19419 ;          8768  incr TWICE from 0 to 1 do                   !FORCE CLASS 'A' AND CLASS 'B' ERRORS
19420 ;          8769      begin
19421 ;          8770      BGNSUB;
19422 ;          8771      CLR_MBUS;
19423 ;          8772
19424 ;          8773      incr CNT from 0 to 255 do
19425 ;          8774          IO_BUF [.CNT] = ZEROES;             !CLEAR OUT IO_BUF
19426 ;          8775
19427 ;          8776      if .TWICE eql 1                         !IF 2ND PASS THEN FORCE 'B' ERROR
19428 ;          8777      then
19429 ;          8778          begin
19430 ;          8779          PROM_RW = ONE;
19431 ;          8780          MLPD = %o'777';
```

```
19433 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
19434 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (92)
19435
19436 ;          8781          end;
19437 ;          8782
19438 ;          8783      GD_BLK_XFER ();                    !SET UP A GOOD BLOCK XFERR
19439 ;          8784      MLCS1 = read;                      !DO A READ FUNCTION
19440 ;          8785
19441 ;          8786      if .TWICE eql 0 then MLDA = ONES;  !IF FIRST PASS THEN FORCE AN 'A' ERROR
19442 ;          8787
19443 ;          8788      TIME_OUT_LOOP;
19444 ;          8789
19445 ;          8790      if .TWICE eql 0                    !SEE WHICH PASS WE'RE ON
19446 ;          8791      then
19447 ;          8792          begin                          !CLASS 'A' ERROR
19448 ;          8793
19449 ;          8794          incr WRD_CNT from 0 to 64 do   !SEE IF XFERR WAY ALLOWED TO CONTINUE
19450 ;          8795              begin
19451 ;          8796
19452 ;          8797              if .IO_BUF [.WRD_CNT] neq ONES   !READ IO_BUF FOR BG PAT
19453 ;          8798              then
19454 ;          8799                  begin                    !ERROR AND EXIT LOOP IF ZEROES
19455 ;          8800                  ERRDF (95, SYNC, DUMPER);
19456 ;          8801                  PRINTB (FOR_FMT, PHR_8, FNC_13, WRD_19, WRD_10);
19457 ;          8802                  exitloop;
19458 ;          8803                  end;
19459 ;          8804
19460 ;          8805              end;
19461 ;          8806
19462 ;          8807          end
19463 ;          8808      else                               !CLASS 'B' ERROR
19464 ;          8809          begin
19465 ;          8810
19466 ;          8811          incr WRD_CNT from 0 to 64 do   !SEE IF XFERR WAS ABORTED
19467 ;          8812              begin
19468 ;          8813
19469 ;          8814              if .IO_BUF [.WRD_CNT] neq ZEROES   !READ IO_BUF CLEARED DATA
19470 ;          8815              then
19471 ;          8816                  begin                    !ERROR IF ONES AND EXIT LOOP
19472 ;          8817                  ERRDF (96, SYNC, DUMPER);
19473 ;          8818                  PRINTB (FOR_FMT, PHR_9, FNC_13, WRD_19, WRD_10);
19474 ;          8819                  exitloop
19475 ;          8820                  end;
19476 ;          8821
19477 ;          8822              end;
19478 ;          8823
19479 ;          8824          end;
19480 ;          8825
19481 ;          8826      if .SC IS_NOT_SET                  !SEE IF SC BIT SET
19482 ;          8827      then
19483 ;          8828          begin                          !ERROR IF NOT SET
19484 ;          8829          ERRDF (104, SYNC, DUMPER);
19485 ;          8830          PRINTB (FIV_FMT, WRD_59, PHR_1, WRD_11, WRD_19, FNC_13)
19486 ;          8831          end;
19487 ;          8832
```

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19489 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
19490 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (92)
19491
19492 ;          8833      ENDSUB;
19493 ;          8834      end;
19494 ;          8835
19495 ;          8836  ENDTST;
19499
19500                                        .SBTTL  $T42
19504 067534  004167  114320          $T42: JSR     R1,$SAVE3                ;                              8727
19505 067540  152777  000040  123446        BISB    #40,@ML.REG+40           ;                              8730
19506 067546  016703  124030                MOV     ML.DUT,R3
19507 067552  042703  177770                BIC     #177770,R3
19508 067556  142777  000007  123430        BICB    #7,@ML.REG+40
19509 067564  150377  123424                BISB    R3,@ML.REG+40
19510 067570  152777  000010  123416        BISB    #10,@ML.REG+40           ;                              8762
19511 067576  012767  177777  121774        MOV     #-1,IO.BUF               ;                              8763
19512 067604  004767  126260                JSR     PC,GD.BLK.XFER           ;                              8764
19513 067610  012777  000061  123336        MOV     #61,@ML.REG              ;                              8765
19514 067616  105777  123402          1$:   TSTB    @ML.REG+50
19515 067622  100375                BPL     1$
19516 067624  005003                CLR     R3                               ; TWICE                        8768
19517 067626  104402                TRAP    2                                ;                              8769
19518 067630  152777  000040  123356        BISB    #40,@ML.REG+40           ;                              8770
19519 067636  016702  123740                MOV     ML.DUT,R2
19520 067642  042702  177770                BIC     #177770,R2
19521 067646  142777  000007  123340        BICB    #7,@ML.REG+40
19522 067654  150277  123334                BISB    R2,@ML.REG+40
19523 067660  005000                CLR     R0                               ; CNT                          8773
19524 067662  010001          3$:   MOV     R0,R1                            ; CNT,*                        8774
19525 067664  006301                ASL     R1
19526 067666  005061  011600              CLR     IO.BUF(R1)
19527 067672  005200                INC     R0                               ; CNT                          8773
19528 067674  020027  000377              CMP     R0,#377                          ; CNT,*
19529 067700  003770                BLE     3$
19530 067702  020327  000001              CMP     R3,#1                            ; TWICE,*                      8776
19531 067706  001006                BNE     4$
19532 067710  152777  000100  123356        BISB    #100,@ML.REG+120         ;                              8779
19533 067716  012777  000777  123460        MOV     #777,@ML.REG+230         ;                              8780
19534 067724  004767  126140          4$:   JSR     PC,GD.BLK.XFER           ;                              8783
19535 067730  012777  000071  123216        MOV     #71,@ML.REG              ;                              8784
19536 067736  005002                CLR     R2                               ;                              8786
19537 067740  005703                TST     R3                               ; TWICE
19538 067742  001004                BNE     5$
19539 067744  005202                INC     R2
19540 067746  012777  177777  123230        MOV     #-1,@ML.REG+30
19541 067754  105777  123244          5$:   TSTB    @ML.REG+50
19542 067760  100375                BPL     5$
19543 067762  006002                ROR     R2                               ;                              8790
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19545                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
19546                                   ;                                                       14-May-1981 13:05:08    PA:<
19547
19548 067764  103037                          BCC     8$
19549 067766  005002                          CLR     R2                      ; WRD.CNT                               8794
19550 067770  010201                    6$:   MOV     R2,R1                   ; WRD.CNT,*                             8797
19551 067772  006301                          ASL     R1
19552 067774  026127  011600  177777          CMP     IO.BUF(R1),#-1
19553 070002  001423                          BEQ     7$
19554 070004  104455                          TRAP    55                      ;                                       8800
19555 070006  000137                          .WORD   137
19556 070010  010526                          .WORD   SYNC
19557 070012  024060                          .WORD   DUMPER
19558 070014  012746  006406                  MOV     #WRD.10,-(SP)           ;                                       8801
19559 070020  012746  006506                  MOV     #WRD.19,-(SP)
19560 070024  012746  010112                  MOV     #FNC.13,-(SP)
19561 070030  012746  007540                  MOV     #PHR.8,-(SP)
19562 070034  012746  006046                  MOV     #FOR.FMT,-(SP)
19563 070040  012746  000005                  MOV     #5,-(SP)
19564 070044  010600                          MOV     SP,R0                   ; SP,*
19565 070046  104414                          TRAP    14
19566 070050  000435                          BR      10$                     ;                                       8802
19567 070052  005202                    7$:   INC     R2                      ; WRD.CNT                               8794
19568 070054  020227  000100                  CMP     R2,#100                 ; WRD.CNT,*
19569 070060  003743                          BLE     6$
19570 070062  000437                          BR      12$                     ;                                       8790
19571 070064  005002                    8$:   CLR     R2                      ; WRD.CNT                               8811
19572 070066  010201                    9$:   MOV     R2,R1                   ; WRD.CNT,*                             8814
19573 070070  006301                          ASL     R1
19574 070072  005761  011600                  TST     IO.BUF(R1)
19575 070076  001425                          BEQ     11$
19576 070100  104455                          TRAP    55                      ;                                       8817
19577 070102  000140                          .WORD   140
19578 070104  010526                          .WORD   SYNC
19579 070106  024060                          .WORD   DUMPER
19580 070110  012746  006406                  MOV     #WRD.10,-(SP)           ;                                       8818
19581 070114  012746  006506                  MOV     #WRD.19,-(SP)
19582 070120  012746  010112                  MOV     #FNC.13,-(SP)
19583 070124  012746  007552                  MOV     #PHR.9,-(SP)
19584 070130  012746  006046                  MOV     #FOR.FMT,-(SP)
19585 070134  012746  000005                  MOV     #5,-(SP)
19586 070140  010600                          MOV     SP,R0                   ; SP,*
19587 070142  104414                          TRAP    14
19588 070144  062706  000014            10$:  ADD     #14,SP                  ;                                       8819
19589 070150  000404                          BR      12$
19590 070152  005202                    11$:  INC     R2                      ; WRD.CNT                               8811
19591 070154  020227  000100                  CMP     R2,#100                 ; WRD.CNT,*
19592 070160  003742                          BLE     9$
19593 070162  032777  100000  122764    12$:  BIT     #100000,@ML.REG         ;                                       8826
19594 070170  001026                          BNE     13$
19595 070172  104455                          TRAP    55                      ;                                       8829
19596 070174  000150                          .WORD   150
19597 070176  010526                          .WORD   SYNC
19598 070200  024060                          .WORD   DUMPER
19599 070202  012746  010112                  MOV     #FNC.13,-(SP)           ;                                       8830
```

```
19601                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
19602                                   ;                                                       14-May-1981 13:05:08    PA:<
19603
19604 070206  012746  006506                      MOV     #WRD.19,-(SP)
19605 070212  012746  006416                      MOV     #WRD.11,-(SP)
19606 070216  012746  007366                      MOV     #PHR.1,-(SP)
19607 070222  012746  007152                      MOV     #WRD.59,-(SP)
19608 070226  012746  006062                      MOV     #FIV.FMT,-(SP)
19609 070232  012746  000006                      MOV     #6,-(SP)
19610 070236  010600                            MOV     SP,R0                           ; SP,*
19611 070240  104414                            TRAP    14
19612 070242  062706  000016                    ADD     #16,SP                          ;                                       8828
19613 070246  104467                  13$:      TRAP    67                              ;                                       8831
19614 070250  006000                            ROR     R0
19615 070252  103002                            BHIS    15$
19616 070254  000167  177346          14$:      JMP     2$
19617 070260  005203                  15$:      INC     R3                              ; TWICE                                 8768
19618 070262  020327  000001                    CMP     R3,#1                           ; TWICE,*
19619 070266  003772                            BLE     14$
19620 070270  000207                            RTS     PC                              ;                                       8727
19621
19622                                   ; Routine Size:  175 words
19623                                   ; Maximum stack depth per invocation:  11 words
19628
19629
19633
19634                                             .SBTTL  T42
19638 070272                            T42::
19639 070272  004767  177236            1$:       JSR     PC,$T42                         ;                                       8834
19640 070276  104466                            TRAP    66
19641 070300  006000                            ROR     R0
19642 070302  103773                            BLO     1$
19643 070304  000207                            RTS     PC
19644
19645                                   ; Routine Size:  6 words
19646                                   ; Maximum stack depth per invocation:  0 words
19651
19652
19653 ;           8837  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (93)

```
19655 ;ML4
19656 ;
19657 ;
19658 ;          8838  !
19659 ;          8839  !
19660 ;          8840  BGNTST;
19661 ;          8841
19662 ;          8842  !++
19663 ;          8843  ! TEST NUMBER:  TST 43
19664 ;          8844  !
19665 ;          8845  ! TEST NAME:    LAST BLOCK TRANSFER TEST
19666 ;          8846  !
19667 ;          8847  ! TEST DESCRIPTION:
19668 ;          8848  !
19669 ;          8849  !       TEST THE LAST BLOCK INDICATOR BIT
19670 ;          8850  !       FOR SETTING/NOT SETTING AND THE
19671 ;          8851  !       DSA REGISTER FOR INCREMENTING BY:
19672 ;          8852  !
19673 ;          8853  !       1.  DOING MBUS TRANSFERRS AT EACH
19674 ;          8854  !           BLOCK FROM BLOCK ZERO TO
19675 ;          8855  !           LAST BLOCK -1 AND TEST LBT
19676 ;          8856  !           CLEAR AND DSA REGISTER TO BE
19677 ;          8857  !           INCREMENTED.
19678 ;          8858  !
19679 ;          8859  !       2.  DO A MBUS TRANSFERR AT
19680 ;          8860  !           THE LAST BLOCK.
19681 ;          8861  !           TEST LBT TO BE SET AND
19682 ;          8862  !           TEST FOR CLEAR.
19683 ;          8863  !           TEST DSA REG TO BE INCREMENTED.
19684 ;          8864  !
19685 ;          8865  ! IMPLICIT INPUTS:
19686 ;          8866  !       IO_BUF
19687 ;          8867  !       A VECTOR OF 256 WORDS WHERE
19688 ;          8868  !       DATA FOR MBUS READS AND WRITE
19689 ;          8869  !       FUNCTION ARE FOUND.
19690 ;          8870  !
19691 ;          8871  !--
19692 ;          8872
19693 ;          8873  local
19694 ;          8874      DODU_FLG;                          !DROP UNIT FLAG
19695 ;          8875
19696 ;          8876  DODU_FLG = ZERO;
19697 ;          8877
19698 ;          8878  incr DSA_CNT from 0 to .LST_BLK - 1 do      !DO XFERRS UP TO THE LAST BLOCK
19699 ;          8879      begin
19700 ;          8880      BGNSUB;
19701 ;          8881      CLR_MBUS;
19702 ;          8882      ECC_DIS = ONE;                     !DISABLE ECC
19703 ;          8883      MLWC = not 255;                    !LOAD WORD COUNT
19704 ;          8884      MLBA = IO_BUF;                     !LOAD UBUS ADRS
19705 ;          8885      MLDA = .DSA_CNT;                   !LOAD DSA WITH DSA_CNT
19706 ;          8886      MLCS1 = write;                     !DO A WRITE FUNCTION
19707 ;          8887      TIME_OUT_LOOP;
19708 ;          8888
19709 ;          8889      if .LBT IS_SET                     !SEE IF THE LAST BLOCK XFERR BIT SET
```

```
19711 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
19712 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (93)
19713 ;
19714 ;          8890       then
19715 ;          8891           begin                                  !ERROR AND SET DODU_FLG IF SET
19716 ;          8892           ERRDF (97, ASYNC, DUMPER);
19717 ;          8893           PRINTB (THR_FMT, WRD_27, PHR_5, WRD_29);
19718 ;          8894           PRINTB (FMT_7, .DSA_CNT);
19719 ;          8895           DODU_FLG = ONE;
19720 ;          8896           end;
19721 ;          8897
19722 ;          8898       if .MLDA neq .DSA_CNT + 1                  !SEE IF THE DSA REG INCREMENTED
19723 ;          8899       then
19724 ;          8900           begin                                  !ERROR AND SET DODU_FLG IF NOT
19725 ;          8901           ERRDF (98, ASYNC, DUMPER);
19726 ;          8902           PRINTB (THR_FMT, REG_6, WRD_31, WRD_14);
19727 ;          8903           PRINTB (FMT_7, .DSA_CNT);
19728 ;          8904           DODU_FLG = ONE;
19729 ;          8905           end;
19730 ;          8906
19731 ;          8907       ENDSUB;
19732 ;          8908       end;
19733 ;          8909
19734 ;          8910   BGNSUB;
19735 ;          8911   CLR_MBUS;
19736 ;          8912   ECC_DIS = ONE;                                 !DISABLE ECC
19737 ;          8913   LAST_BLK_XFER ();                              !SET UP A LAST BLOCK XFERR
19738 ;          8914   MLCST = write;                                 !DO A WRITE FUNCTION
19739 ;          8915   TIME_OUT_LOOP;
19740 ;          8916
19741 ;          8917   if .MLDA neq .LST_BLK + 1                      !SEE IF DSA REGISTER INCREMENTED
19742 ;          8918   then
19743 ;          8919       begin                                      !ERROR AND SET DODU_FLG IF NOT
19744 ;          8920       ERRDF (101, ASYNC, DUMPER);
19745 ;          8921       PRINTB (THR_FMT, REG_6, WRD_31, WRD_14);
19746 ;          8922       PRINTB (FMT_7, .LST_BLK);
19747 ;          8923       DODU_FLG = ONE;
19748 ;          8924       end;
19749 ;          8925
19750 ;          8926   if .LBT IS_SET                                 !SEE IF LBT BIT SET
19751 ;          8927   then
19752 ;          8928       begin
19753 ;          8929       MLDA = ONES;                               !IF SET THEN TRY TO CLEAR IT
19754 ;          8930
19755 ;          8931       if .LBT IS_SET                             !SEE IF BIT CLEARED
19756 ;          8932       then
19757 ;          8933           begin                                  !ERROR IF NOT
19758 ;          8934           ERRDF (99, ASYNC, DUMPER);
19759 ;          8935           PRINTB (FIV_FMT, WRD_27, PHR_2, WRD_11, WRD_17, REG_6);
19760 ;          8936           DODU_FLG = ONE;
19761 ;          8937           end;
19762 ;          8938
19763 ;          8939       end
19764 ;          8940   else                                           !LBT NOT SET
19765 ;          8941       begin                                      !ERROR AND SET DODU_FLG
```

```
                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
                                                                    14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (93)

;ML4
;
;          8942      ERRDF (100, ASYNC, DUMPER);
;          8943      PRINTB (FOR_FMT, WRD_27, PHR_1, WRD_11, WRD_27);
;          8944      DODU_FLG = ONE;
;          8945      end;
;          8946
;          8947  ENDSUB;
;          8948
;          8949  if .DODU_FLG IS_SET                          !DROP THIS UNIT IF DODU_FLG SET
;          8950  then
;          8951      begin
;          8952      DODU (.ML_LUN);
;          8953      DOCLN;
;          8954      end;
;          8955
;          8956  ENDTST;

                                        .SBTTL  $T43
070306  004167  113564          $T43:   JSR     R1,$SAVE4                       ;                       8836
070312  005001                          CLR     R1                              ; DODU.FLG              8876
070314  016704  121252                  MOV     LST.BLK,R4                      ;                       8878
070320  005002                          CLR     R2                              ; DSA.CNT
070322  000541                          BR      6$
070324  010203                  1$:     MOV     R2,R3                           ; DSA.CNT,*             8898
070326  005203                          INC     R3
070330  104402                  2$:     TRAP    2                               ;                       8879
070332  152777  000040  122654          BISB    #40,@ML.REG+40                  ;                       8880
070340  016700  123236                  MOV     ML.DUT,R0
070344  042700  177770                  BIC     #177770,R0
070350  142777  000007  122636          BICB    #7,@ML.REG+40
070356  150077  122632                  BISB    R0,@ML.REG+40
070362  152777  000002  122704          BISB    #2,@ML.REG+120                  ;                       8882
070370  012777  177400  122566          MOV     #-400,@ML.REG+10                ;                       8883
070376  012777  011600  122570          MOV     #IO.BUF,@ML.REG+20              ;                       8884
070404  010277  122574                  MOV     R2,@ML.REG+30                   ; DSA.CNT,*             8885
070410  012777  000061  122536          MOV     #61,@ML.REG                     ;                       8886
070416  105777  122602          3$:     TSTB    @ML.REG+50
070422  100375                          BPL     3$
070424  032777  002000  122572          BIT     #2000,@ML.REG+50                ;                       8889
070432  001433                          BEQ     4$
070434  104455                          TRAP    55                              ;                       8892
070436  000141                          .WORD   141
070440  010464                          .WORD   ASYNC
070442  024060                          .WORD   DUMPER
070444  012746  006610                  MOV     #WRD.29,-(SP)                   ;                       8893
070450  012746  007472                  MOV     #PHR.5,-(SP)
070454  012746  006602                  MOV     #WRD.27,-(SP)
```

```
                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                        MOV     #THR.FMT,-(SP)
                                        MOV     #4,-(SP)
                                        MOV     SP,R0                           ; SP,*
                                        TRAP    14
                                        MOV     R2,(SP)                         ; DSA.CNT,*                             8894
                                        MOV     #FMT.7,-(SP)
                                        MOV     #2,-(SP)
                                        MOV     SP,R0                           ; SP,*
                                        TRAP    14
                                        MOV     #1,R1                           ; *,DODU.FLG                            8895
                                        ADD     #16,SP                          ;                                       8891
                                4$:     CMP     @ML.REG+30,R3                   ;                                       8898
                                        BEQ     5$
                                        TRAP    55                              ;                                       8901
                                        .WORD   142
                                        .WORD   ASYNC
                                        .WORD   DUMPER
                                        MOV     #WRD.14,-(SP)                   ;                                       8902
                                        MOV     #WRD.31,-(SP)
                                        MOV     #REG.6,-(SP)
                                        MOV     #THR.FMT,-(SP)
                                        MOV     #4,-(SP)
                                        MOV     SP,R0                           ; SP,*
                                        TRAP    14
                                        MOV     R2,(SP)                         ; DSA.CNT,*                             8903
                                        MOV     #FMT.7,-(SP)
                                        MOV     #2,-(SP)
                                        MOV     SP,R0                           ; SP,*
                                        TRAP    14
                                        MOV     #1,R1                           ; *,DODU.FLG                            8904
                                        ADD     #16,SP                          ;                                       8900
                                5$:     TRAP    67                              ;                                       8905
                                        ROR     R0
                                        BLO     2$
                                        INC     R2                              ; DSA.CNT                               8878
                                6$:     CMP     R2,R4                           ; DSA.CNT,*
                                        BLT     1$
                                7$:     TRAP    2                               ;                                       8908
                                        BISB    #40,@ML.REG+40                  ;                                       8910
                                        MOV     ML.OUT,R4
                                        BIC     #177770,R4
                                        BICB    #7,@ML.REG+40
                                        BISB    R4,@ML.REG+40
                                        BISB    #2,@ML.REG+120                  ;                                       8912
                                        JSR     PC,LAST.BLK.XFER                ;                                       8913
                                        MOV     #61,@ML.REG                     ;                                       8914
                                8$:     TSTB    @ML.REG+50
                                        BPL     8$
                                        MOV     LST.BLK,R2                      ;                                       8917
                                        INC     R2
                                        CMP     @ML.REG+30,R2
                                        BEQ     9$
```

```
19879                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
19880                                   ;                                                       14-May-1981 13:05:08    PA:<
19881
19882 070726  104455                          TRAP    55                      ;                                       8920
19883 070730  000145                          .WORD   145
19884 070732  010464                          .WORD   ASYNC
19885 070734  024060                          .WORD   DUMPER
19886 070736  012746  006442                  MOV     #WRD.14,-(SP)           ;                                       8921
19887 070742  012746  006632                  MOV     #WRD.31,-(SP)
19888 070746  012746  010316                  MOV     #REG.6,-(SP)
19889 070752  012746  006034                  MOV     #THR.FMT,-(SP)
19890 070756  012746  000004                  MOV     #4,-(SP)
19891 070762  010600                          MOV     SP,R0                   ; SP,*
19892 070764  104414                          TRAP    14
19893 070766  016716  120600                  MOV     LST.BLK,(SP)            ;                                       8922
19894 070772  012746  004562                  MOV     #FMT.7,-(SP)
19895 070776  012746  000002                  MOV     #2,-(SP)
19896 071002  010600                          MOV     SP,R0                   ; SP,*
19897 071004  104414                          TRAP    14
19898 071006  012701  000001                  MOV     #1,R1                   ; *,DODU.FLG                            8923
19899 071012  062706  000016                  ADD     #16,SP                  ;                                       8919
19900 071016  032777  002000  122200  9$:     BIT     #2000,@ML.REG+50        ;                                       8926
19901 071024  001440                          BEQ     10$
19902 071026  012777  177777  122150          MOV     #-1,@ML.REG+30          ;                                       8929
19903 071034  032777  002000  122162          BIT     #2000,@ML.REG+50        ;                                       8931
19904 071042  001457                          BEQ     11$
19905 071044  104455                          TRAP    55                      ;                                       8934
19906 071046  000143                          .WORD   143
19907 071050  010464                          .WORD   ASYNC
19908 071052  024060                          .WORD   DUMPER
19909 071054  012746  010316                  MOV     #REG.6,-(SP)            ;                                       8935
19910 071060  012746  006470                  MOV     #WRD.17,-(SP)
19911 071064  012746  006416                  MOV     #WRD.11,-(SP)
19912 071070  012746  007404                  MOV     #PHR.2,-(SP)
19913 071074  012746  006602                  MOV     #WRD.27,-(SP)
19914 071100  012746  006062                  MOV     #FIV.FMT,-(SP)
19915 071104  012746  000006                  MOV     #6,-(SP)
19916 071110  010600                          MOV     SP,R0                   ; SP,*
19917 071112  104414                          TRAP    14
19918 071114  012701  000001                  MOV     #1,R1                   ; *,DODU.FLG                            8936
19919 071120  062706  000016                  ADD     #16,SP                  ;                                       8933
19920 071124  000426                          BR      11$                     ;                                       8926
19921 071126  104455                  10$:    TRAP    55                      ;                                       8942
19922 071130  000144                          .WORD   144
19923 071132  010464                          .WORD   ASYNC
19924 071134  024060                          .WORD   DUMPER
19925 071136  012746  006602                  MOV     #WRD.27,-(SP)           ;                                       8943
19926 071142  012746  006416                  MOV     #WRD.11,-(SP)
19927 071146  012746  007366                  MOV     #PHR.1,-(SP)
19928 071152  012746  006602                  MOV     #WRD.27,-(SP)
19929 071156  012746  006046                  MOV     #FOR.FMT,-(SP)
19930 071162  012746  000005                  MOV     #5,-(SP)
19931 071166  010600                          MOV     SP,R0                   ; SP,*
19932 071170  104414                          TRAP    14
19933 071172  012701  000001                  MOV     #1,R1                   ; *,DODU.FLG                            8944
```

```
19935                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
19936                                   ;                                                       14-May-1981 13:05:08    PA:<
19937
19938 071176  062706  000014                      ADD     #14,SP                          ;                               8941
19939 071202  104467                    11$:      TRAP    67                              ;                               8945
19940 071204  006000                              ROR     R0
19941 071206  103611                              BLO     7$
19942 071210  005301                              DEC     R1                              ; DODU.FLG                      8949
19943 071212  001004                              BNE     12$
19944 071214  016700  122360                      MOV     ML.LUN,R0                       ;                               8952
19945 071220  104451                              TRAP    51
19946 071222  104444                              TRAP    44
19947 071224  000207                    12$:      RTS     PC                              ;                               8836
19948
19949                                   ; Routine Size:  232 words
19950                                   ; Maximum stack depth per invocation:  12 words
19955
19956
19960
19961                                             .SBTTL  T43
19965 071226                            T43::
19966 071226  004767  177054            1$:       JSR     PC,$T43                         ;                               8954
19967 071232  104466                              TRAP    66
19968 071234  006000                              ROR     R0
19969 071236  103773                              BLO     1$
19970 071240  000207                              RTS     PC
19971
19972                                   ; Routine Size:  6 words
19973                                   ; Maximum stack depth per invocation:  0 words
19978
19979
19980 ;          8957  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (94)

```
;ML4
;
;          8958  !
;          8959  !
;          8960  BGNTST;
;          8961
;          8962  !++
;          8963  ! TEST NUMBER:  TST 44
;          8964  !
;          8965  ! TEST NAME:    INVALID ADRS TEST
;          8966  !
;          8967  ! TEST DESCRIPTION:
;          8968  !
;          8969  !       TEST THE DETECTION OF ILLEGAL DSA
;          8970  !       ADDRESSES BY:
;          8971  !
;          8972  !       1.  DOING A MBUS WRITE FUNCTION
;          8973  !           AT ALL POSSIBLE ILLEGAL DSA
;          8974  !           ADDRESSES AND TEST THE
;          8975  !           IAE BIT SET.
;          8976  !
;          8977  ! IMPLICIT INPUTS:
;          8978  !
;          8979  !       IO_BUF
;          8980  !       A VECTOR OF 256 WORDS WHERE
;          8981  !       DATA FOR MBUS READS AND WRITE
;          8982  !       FUNCTION ARE FOUND.
;          8983  !
;          8984  !
;          8985  !--
;          8986
;          8987  local
;          8988      IAE_CNT;                                    !INVLID ADRS COUNT
;          8989
;          8990  IAE_CNT = .LST_BLK;                            !START AT LAST  BLOCK + 1
;          8991
;          8992  do                                            !TEST FOR ALL INVALID ADDRESSES
;          8993      begin
;          8994      IAE_CNT = .IAE_CNT + 1;                   !INCREMENT IAE_CNT
;          8995      BGNSUB;
;          8996      CLR_MBUS;
;          8997      MLDA = .IAE_CNT;                          !LOAD DSA
;          8998      MLWC = not 255;                           !LOAD WORD COUNT
;          8999      MLBA = IO_BUF;                            !LOAD UBUS ADRS
;          9000      MLCS1 = write;                            !DO A WRITE FUNCTION
;          9001
;          9002      if .IAE IS_NOT_SET                        !SET IF IAE SET
;          9003      then
;          9004          begin                                 !ERROR IF NOT SET
;          9005          ERRDF (102, ASYNC, DUMPER);
;          9006          PRINTB (FIV_FMT, WRD_30, PHR_1, WRD_11, WRD_30, WRD_10);
;          9007          end;
;          9008
;          9009      ENDSUB;
```

```
20038 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
20039 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (94)
20040
20041 ;          9010      end
20042 ;          9011  until .IAE_CNT eql %o'177777';                !REPEAT UNTIL ALL TESTED
20043 ;          9012
20044 ;          9013  ENDTST;
20048
20049                                        .SBTTL  $T44
20053 071242  010146                 $T44:   MOV     R1,-(SP)                        ;                                8956
20054 071244  016701  120322                 MOV     LST.BLK,R1                      ; *,IAE.CNT                      8990
20055 071250  005201                 1$:     INC     R1                              ; IAE.CNT                        8994
20056 071252  104402                 2$:     TRAP    2
20057 071254  152777  000040  121732         BISB    #40,@ML.REG+40                  ;                                8995
20058 071262  016700  122314                 MOV     ML.DUT,R0
20059 071266  042700  177770                 BIC     #177770,R0
20060 071272  142777  000007  121714         BICB    #7,@ML.REG+40
20061 071300  150077  121710                 BISB    R0,@ML.REG+40
20062 071304  010177  121674                 MOV     R1,@ML.REG+30                   ; IAE.CNT,*                      8997
20063 071310  012777  177400  121646         MOV     #-400,@ML.REG+10                ;                                8998
20064 071316  012777  011600  121650         MOV     #IO.BUF,@ML.REG+20              ;                                8999
20065 071324  012777  000061  121622         MOV     #61,@ML.REG                     ;                                9000
20066 071332  032777  002000  121674         BIT     #2000,@ML.REG+60                ;                                9002
20067 071340  001026                         BNE     3$
20068 071342  104455                         TRAP    55                              ;                                9005
20069 071344  000146                         .WORD   146
20070 071346  010464                         .WORD   ASYNC
20071 071350  024060                         .WORD   DUMPER
20072 071352  012746  006406                 MOV     #WRD.10,-(SP)                   ;                                9006
20073 071356  012746  006624                 MOV     #WRD.30,-(SP)
20074 071362  012746  006416                 MOV     #WRD.11,-(SP)
20075 071366  012746  007366                 MOV     #PHR.1,-(SP)
20076 071372  012746  006624                 MOV     #WRD.30,-(SP)
20077 071376  012746  006062                 MOV     #FIV.FMT,-(SP)
20078 071402  012746  000006                 MOV     #6,-(SP)
20079 071406  010600                         MOV     SP,R0                           ; SP,*
20080 071410  104414                         TRAP    14
20081 071412  062706  000016                 ADD     #16,SP                          ;                                9004
20082 071416  104467                 3$:     TRAP    67                              ;                                9007
20083 071420  006000                         ROR     R0
20084 071422  103713                         BLO     2$
20085 071424  020127  177777                 CMP     R1,#-1                          ; IAE.CNT,*                      9011
20086 071430  001307                         BNE     1$
20087 071432  012601                         MOV     (SP)+,R1                        ;                                8956
20088 071434  000207                         RTS     PC
20089
20090                                ; Routine Size:  62 words
20091                                ; Maximum stack depth per invocation:  8 words
```

```
                                                                                                                    H 16
20100
20101
20105
20106                                           .SBTTL  T44
20110 071436                            T44::
20111 071436  004767  177600              1$:   JSR     PC,$T44                         ;                                  9011
20112 071442  104466                            TRAP    66
20113 071444  006000                            ROR     R0
20114 071446  103773                            BLO     1$
20115 071450  000207                            RTS     PC
20116
20117                                   ; Routine Size:  6 words
20118                                   ; Maximum stack depth per invocation:  0 words
20123
20124
20125 ;          9014  !<BLF/PAGE>
```

```
20127 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
20128 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (95)
20129
20130 ;          9015  !
20131 ;          9016  BGNTST;
20132 ;          9017
20133 ;          9018  !++
20134 ;          9019  ! TEST NUMBER:  TST 45
20135 ;          9020  !
20136 ;          9021  ! TEST NAME:    ADRS OVERFLOW BIT TEST
20137 ;          9022  !
20138 ;          9023  ! TEST DESCRIPTION:
20139 ;          9024  !       TEST THE DETECTION OF ADDRESS OVERFLOWS BY:
20140 ;          9025  !
20141 ;          9026  !       1.  STARTING AT THE LAST BLOCK DO A TWO BLOCK TRANSFER.
20142 ;          9027  !
20143 ;          9028  !       2.  READ THE AOE BIT SET.
20144 ;          9029  !
20145 ;          9030  ! IMPLICIT INPUTS:
20146 ;          9031  !       IO_BUF
20147 ;          9032  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
20148 ;          9033  !       FUNCTIONS ARE FOUND.
20149 ;          9034  !--
20150 ;          9035
20151 ;          9036  CLR_MBUS;
20152 ;          9037  MLWC = not 511;                                 !DO TWO BLOCK XFERR
20153 ;          9038  MLBA = IO_BUF;                                  !LOAD UBUS ADRS
20154 ;          9039  MLDA = .LST_BLK;                                !START AT LAST BLOCK
20155 ;          9040  MLCS1 = write;                                  !DO A WRITE FUNCTION
20156 ;          9041  TIME_OUT_LOOP;
20157 ;          9042
20158 ;          9043  if .AOE IS_NOT_SET                            !SEE IF AOE SET
20159 ;          9044  then
20160 ;          9045      begin                                     !ERROR IF NOT SET
20161 ;          9046      ERRDF (103, SYNC, DUMPER);
20162 ;          9047      PRINTB (FOR_FMT, WRD_26, PHR_1, WRD_11, FNC_19);
20163 ;          9048      end;
20164 ;          9049
20165 ;          9050  ENDTST;
20169
20170                                          .SBTTL  $T45
20174 071452  152777  000040  121534  $T45:   BISB    #40,@ML.REG+40                  ;                       9016
20175 071460  016700  122116                  MOV     ML.DUT,R0
20176 071464  042700  177770                  BIC     #177770,R0
20177 071470  142777  000007  121516          BICB    #7,@ML.REG+40
20178 071476  150077  121512                  BISB    R0,@ML.REG+40
20179 071502  012777  177000  121454          MOV     #-1000,@ML.REG+10               ;                       9037
20180 071510  012777  011600  121456          MOV     #IO.BUF,@ML.REG+20              ;                       9038
20181 071516  016777  120050  121460          MOV     LST.BLK,@ML.REG+30              ;                       9039
```

```
20183                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
20184                                   ;                                                       14-May-1981 13:05:08    PA:<
20185
20186 071524  012777  000061  121422            MOV     #61,@ML.REG                     ;                               9040
20187 071532  105777  121466          1$:       TSTB    @ML.REG+50
20188 071536  100375                            BPL     1$
20189 071540  032777  001000  121466            BIT     #1000,@ML.REG+60                ;                               9043
20190 071546  001024                            BNE     2$
20191 071550  104455                            TRAP    55                              ;                               9046
20192 071552  000147                            .WORD   147
20193 071554  010526                            .WORD   SYNC
20194 071556  024060                            .WORD   DUMPER
20195 071560  012746  010204                    MOV     #FNC.19,-(SP)                   ;                               9047
20196 071564  012746  006416                    MOV     #WRD.11,-(SP)
20197 071570  012746  007366                    MOV     #PHR.1,-(SP)
20198 071574  012746  006574                    MOV     #WRD.26,-(SP)
20199 071600  012746  006046                    MOV     #FOR.FMT,-(SP)
20200 071604  012746  000005                    MOV     #5,-(SP)
20201 071610  010600                            MOV     SP,R0                           ; SP,*
20202 071612  104414                            TRAP    14
20203 071614  062706  000014                    ADD     #14,SP                          ;                               9045
20204 071620  000207                    2$:     RTS     PC                              ;                               9013
20205
20206                                   ; Routine Size:  52 words
20207                                   ; Maximum stack depth per invocation:  6 words
20212
20213
20217
20218                                           .SBTTL  T45
20222 071622                            T45::
20223 071622  004767  177624            1$:     JSR     PC,$T45                         ;                               9048
20224 071626  104466                            TRAP    66
20225 071630  006000                            ROR     R0
20226 071632  103773                            BLO     1$
20227 071634  000207                            RTS     PC
20228
20229                                   ; Routine Size:  6 words
20230                                   ; Maximum stack depth per invocation:  0 words
20235
20236
20237 ;           9051  !<BLF/PAGE>
```

```
20239 ;ML4
20240 ;
20241
20242 ;          9052  !
20243 ;          9053  BGNTST;
20244 ;          9054
20245 ;          9055  !++
20246 ;          9056  ! TEST NUMBER:  TST 46
20247 ;          9057  !
20248 ;          9058  ! TEST NAME:    SYNC BUS PARITY TEST
20249 ;          9059  !
20250 ;          9060  ! TEST DESCRIPTION:
20251 ;          9061  !       TEST ABILITY OF SYNC BUS TO DETECT AND GENERATE
20252 ;          9062  !       GOOD PARITY BY:
20253 ;          9063  !
20254 ;          9064  !       1.  VIA MBUS WRITE FUNCTION WRITE ALTERNATING ONES AND ZEROES TO THE
20255 ;          9065  !           DEVICE AND READ THE DPAR BIT CLEARED.
20256 ;          9066  !
20257 ;          9067  !       2.  REPEAT WITH SHIFTED DATA
20258 ;          9068  !
20259 ;          9069  !       3.  VIA MBUS READ FUNCTION READ THE ALTERNATING PATTERN AND MDPE CLEARED.
20260 ;          9070  !
20261 ;          9071  ! IMPLICIT INPUTS:
20262 ;          9072  !       IO_BUF
20263 ;          9073  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITES
20264 ;          9074  !       FUNCTIONS ARE FOUND.
20265 ;          9075  !--
20266 ;          9076
20267 ;          9077  if .PAR_DIS IS_SET                          !SEE IF PARITY IS DISABLED
20268 ;          9078  then
20269 ;          9079      begin                                   !PRINT MESSAGE AND EXIT TST IF YES
20270 ;          9080      PRINTB (THR_FMT, FNC_3, WRD_7, WRD_37);
20271 ;          9081      EXIT_TST;
20272 ;          9082      end;
20273 ;          9083
20274 ;          9084  CLR_MBUS;
20275 ;          9085  BAI = ONE;                                  !SET ON FIRST IO_BUF ADRS
20276 ;          9086  IO_BUF = %o'125252';                        !ALTERNATE 1, 0 PATTERN
20277 ;          9087
20278 ;          9088  incr TWICE from 0 to 1 do                   !REPEAT LOOP TWICE
20279 ;          9089      begin
20280 ;          9090      BGNSUB;
20281 ;          9091      GD_BLK_XFER ();                         !SET UP A GOOD BLOCK XFERR
20282 ;          9092      MLCS1 = write;                          !DO A WRITE FUNCTION
20283 ;          9093      TIME_OUT_LOOP;
20284 ;          9094
20285 ;          9095      if .DPAR IS_SET                         !SEE IF DPAR GOT SET
20286 ;          9096      then
20287 ;          9097          begin                               !ERROR IF SET
20288 ;          9098          ERRDF (105, SYNC, DUMPER);
20289 ;          9099          PRINTB (FOR_FMT, WRD_23, WRD_6, WRD_7, WRD_9);
20290 ;          9100          end;
20291 ;          9101
20292 ;          9102      IO_BUF = .IO_BUF^ONE;                   !SHIFT THE IO_BUF & REPEAT
20293 ;          9103      MLER = ZEROES;                          !CLEAR OUT ERROR REG & REPEAT
```

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20295 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
20296 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (96)
20297
20298 ;          9104      ENDSUB;
20299 ;          9105      end;
20300 ;          9106
20301 ;          9107  incr TWICE from 0 to 1 do                    !REPEATE LOOP TWICE
20302 ;          9108      begin
20303 ;          9109      BGNSUB;
20304 ;          9110      CLR_MBUS;
20305 ;          9111      BAI = ONE;                                !SET ON FIRST IO_BUF ADRS
20306 ;          9112      GD_BLK_XFER ();                           !SET UP A GOOD BLOCK XFERR
20307 ;          9113      ML.CS1 = read;                            !DO A READ XFERR
20308 ;          9114      TIME_OUT_LOOP;
20309 ;          9115
20310 ;          9116      if .MDPE IS_SET                           !SEE IF READ GENERATED BAD PARITY
20311 ;          9117      then
20312 ;          9118          begin                                 !ERROR IF MDPE SET
20313 ;          9119          ERRDF (106, SYNC, DUMPER);
20314 ;          9120          PRINTB (FOR_FMT, WRD_23, WRD_6, WRD_7, WRD_8);
20315 ;          9121          end;
20316 ;          9122
20317 ;          9123      ENDSUB;
20318 ;          9124      IO_BUF = .IO_BUF^ONE;                     !MAKE DATA PATTERN HAVE ONE LESS ONE
20319 ;          9125      GD_BLK_XFER ();                           !SET UP A GOOD BLK XFER
20320 ;          9126      ML.CS1 = write;                           !CHANGE THE BACKGROUND IN MEMORY
20321 ;          9127      TIME_OUT_LOOP;
20322 ;          9128      end;
20323 ;          9129
20324 ;          9130  ENDTST;
20328
20329                                        .SBTTL  $T46
20333 071636 010146                $T46:   MOV     R1,-(SP)          ;                          9050
20334 071640 026727 117722 000001          CMP     PAR.DIS,#1        ;                          9077
20335 071646 001021                        BNE     1$
20336 071650 012746 006700                 MOV     #WRD.37,-(SP)     ;                          9080
20337 071654 012746 006344                 MOV     #WRD.7,-(SP)
20338 071660 012746 007750                 MOV     #FNC.3,-(SP)
20339 071664 012746 006034                 MOV     #THR.FMT,-(SP)
20340 071670 012746 000004                 MOV     #4,-(SP)
20341 071674 010600                        MOV     SP,R0             ; SP,*
20342 071676 104414                        TRAP    14
20343 071700 104463                        TRAP    63
20344 071702 062706 000012                 ADD     #12,SP            ;                          9077
20345 071706 000167 000402                 JMP     9$                ;                          9079
20346 071712 152777 000040 121274  1$:     BISB    #40,@ML.REG+40    ;                          9082
20347 071720 016701 121656                 MOV     ML.DUT,R1
20348 071724 042701 177770                 BIC     #177770,R1
20349 071730 142777 000007 121256          BICB    #7,@ML.REG+40
```

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20351                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
20352                                   ;                                                       14-May-1981 13:05:08    PA:<
20353
20354 071736  150177  121252                    BISB    R1,@ML.REG+40
20355 071742  152777  000010  121244            BISB    #10,@ML.REG+40          ;                                       9085
20356 071750  012767  125252  117622            MOV     #-52526,IO.BUF          ;                                       9086
20357 071756  005001                            CLR     R1                      ; TWICE                                 9088
20358 071760  104402                    2$:     TRAP    2                       ;                                       9089
20359 071762  004767  124102                    JSR     PC,GD.BLK.XFER          ;                                       9091
20360 071766  012777  000061  121160            MOV     #61,@ML.REG             ;                                       9092
20361 071774  105777  121224            3$:     TSTB    @ML.REG+50
20362 072000  100375                            BPL     3$
20363 072002  132777  000040  121224            BITB    #40,@ML.REG+60          ;                                       9095
20364 072010  001424                            BEQ     4$
20365 072012  104455                            TRAP    55                      ;                                       9098
20366 072014  000151                            .WORD   151
20367 072016  010526                            .WORD   SYNC
20368 072020  024060                            .WORD   DUMPER
20369 072022  012746  006374                    MOV     #WRD.9,-(SP)            ;                                       9099
20370 072026  012746  006344                    MOV     #WRD.7,-(SP)
20371 072032  012746  006336                    MOV     #WRD.6,-(SP)
20372 072036  012746  006544                    MOV     #WRD.23,-(SP)
20373 072042  012746  006046                    MOV     #FOR.FMT,-(SP)
20374 072046  012746  000005                    MOV     #5,-(SP)
20375 072052  010600                            MOV     SP,R0                   ; SP,*
20376 072054  104414                            TRAP    14
20377 072056  062706  000014                    ADD     #14,SP                  ;                                       9097
20378 072062  006367  117512            4$:     ASL     IO.BUF                  ;                                       9102
20379 072066  005077  121142                    CLR     @ML.REG+60              ;                                       9103
20380 072072  104467                            TRAP    67
20381 072074  006000                            ROR     R0
20382 072076  103730                            BLO     2$
20383 072100  005201                            INC     R1                      ; TWICE                                 9088
20384 072102  020127  000001                    CMP     R1,#1                   ; TWICE,*
20385 072106  003724                            BLE     2$
20386 072110  005001                            CLR     R1                      ; TWICE                                 9107
20387 072112  104402                    5$:     TRAP    2                       ;                                       9108
20388 072114  152777  000040  121072            BISB    #40,@ML.REG+40          ;                                       9109
20389 072122  016700  121454                    MOV     ML.DUT,R0
20390 072126  042700  177770                    BIC     #177770,R0
20391 072132  142777  000007  121054            BICB    #7,@ML.REG+40
20392 072140  150077  121050                    BISB    R0,@ML.REG+40
20393 072144  152777  000010  121042            BISB    #10,@ML.REG+40          ;                                       9111
20394 072152  004767  123712                    JSR     PC,GD.BLK.XFER          ;                                       9112
20395 072156  012777  000071  120770            MOV     #71,@ML.REG             ;                                       9113
20396 072164  105777  121034            6$:     TSTB    @ML.REG+50
20397 072170  100375                            BPL     6$
20398 072172  032777  000400  121014            BIT     #400,@ML.REG+40         ;                                       9116
20399 072200  001424                            BEQ     7$
20400 072202  104455                            TRAP    55                      ;                                       9119
20401 072204  000152                            .WORD   152
20402 072206  010526                            .WORD   SYNC
20403 072210  024060                            .WORD   DUMPER
20404 072212  012746  006360                    MOV     #WRD.8,-(SP)            ;                                       9120
20405 072216  012746  006344                    MOV     #WRD.7,-(SP)
```

```
                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                        ;                                                       14-May-1981 13:05:08    PA:<
                
072222  012746  006336          MOV     #WRD.6,-(SP)
072226  012746  006544          MOV     #WRD.23,-(SP)
072232  012746  006046          MOV     #FOR.FMT,-(SP)
072236  012746  000005          MOV     #5,-(SP)
072242  010600                  MOV     SP,R0                   ; SP,*
072244  104414                  TRAP    14
072246  062706  000014          ADD     #14,SP                  ;                                       9118
072252  104467          7$:     TRAP    67                      ;                                       9121
072254  006000                  ROR     R0
072256  103715                  BLO     5$
072260  006367  117314          ASL     IO.BUF                  ;                                       9124
072264  004767  123600          JSR     PC,GD.BLK.XFER          ;                                       9125
072270  012777  000061  120656  MOV     #61,@ML.REG             ;                                       9126
072276  105777  120722  8$:     TSTB    @ML.REG+50
072302  100375                  BPL     8$
072304  005201                  INC     R1                      ; TWICE                                 9107
072306  020127  000001          CMP     R1,#1                   ; TWICE,*
072312  003677                  BLE     5$
072314  012601          9$:     MOV     (SP)+,R1                ;                                       9050
072316  000207                  RTS     PC
                
                        ; Routine Size:  153 words
                        ; Maximum stack depth per invocation:  7 words
                
                
                
                                .SBTTL  T46
072320                  T46::
072320  004767  177312  1$:     JSR     PC,$T46                 ;                                       9128
072324  104466                  TRAP    66
072326  006000                  ROR     R0
072330  103773                  BLO     1$
072332  000207                  RTS     PC
                
                        ; Routine Size:  6 words
                        ; Maximum stack depth per invocation:  0 words
                
;               9131    !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (97)

```
20463 ;ML4
20464 ;
20465
20466 ;          9132  !
20467 ;          9133  !
20468 ;          9134  BGNTST;
20469 ;          9135
20470 ;          9136  !++
20471 ;          9137  ! TEST NUMBER:  TST 47
20472 ;          9138  !
20473 ;          9139  ! TEST NAME:    WRITE READ ML11
20474 ;          9140  !
20475 ;          9141  ! TEST DESCRIPTION:
20476 ;          9142  !
20477 ;          9143  !       PROVIDES A MBUS READ/WRITE
20478 ;          9144  !       DATA TRANSFER TROUBLE SHOOTING
20479 ;          9145  !       LOOP BY:
20480 ;          9146  !
20481 ;          9147  !       1.  LOAD APPROPRIATE RH REGISTERS.
20482 ;          9148  !           DO A WRITE FUNCTION.
20483 ;          9149  !
20484 ;          9150  !       2.  LOAD APPROPRIATE RH REGISTERS
20485 ;          9151  !           DO A WRITE CHECK FUNCTION.
20486 ;          9152  !
20487 ;          9153  !       3.  COMPLIMENT DATA AND
20488 ;          9154  !           REPEAT.
20489 ;          9155  !
20490 ;          9156  ! IMPLICIT INPUTS:
20491 ;          9157  !
20492 ;          9158  !       IO_BUF
20493 ;          9159  !       A VECTOR OF 256 WORDS WHERE
20494 ;          9160  !       DATA FOR MBUS READ AND WRITE
20495 ;          9161  !       FUNCTIONS IS FOUND.
20496 ;          9162  !
20497 ;          9163  !--
20498 ;          9164
20499 ;          9165  local
20500 ;          9166      TST_PAT;                          !TEST PATTERN
20501 ;          9167
20502 ;          9168  TST_PAT = %o'052525';
20503 ;          9169
20504 ;          9170  incr TWICE from 0 to 1 do             !WRITE READ 1'S AND 0'S ON MBUS
20505 ;          9171      begin
20506 ;          9172      CLR_MBUS;
20507 ;          9173      BAI = ONE;                        !SET ON FIRST IO_BUF ADRS
20508 ;          9174      IO_BUF = .TST_PAT;                !LOAD FIRST IO_BUF ADRS
20509 ;          9175      GD_BLK_XFER ();                   !SET UP A GOOD BLOCK XFERR
20510 ;          9176      MLCS1 = write;                    !DO A WRITE FUNCTION
20511 ;          9177      TIME_OUT_LOOP;
20512 ;          9178      CLR_MBUS;
20513 ;          9179      BAI = ONE;                        !SET ON FIRST IO_BUF ADRS
20514 ;          9180      GD_BLK_XFER ();                   !SET UP A GOOD BLOCK XFERR
20515 ;          9181      MLCS1 = WRT_CHK;                  !DO A WRITE CHECK FUNCTION
20516 ;          9182      TIME_OUT_LOOP;
20517 ;          9183
```

```
20519 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
20520 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (97)
20521
20522 ;          9184      if .WCE IS_SET                     !SEE IF WRITE CHECK ERROR SET
20523 ;          9185      then
20524 ;          9186          begin                          !ERROR IF SET
20525 ;          9187          ERRDF (109, TRBLE_LOOP, DUMPER);
20526 ;          9188          PRINTB (SIX_FMT, FNC_4, WRD_10, WRD_12, FNC_5, FNC_6, FNC_3);
20527 ;          9189          end;
20528 ;          9190
20529 ;          9191      TST_PAT = not .TST_PAT;            !COMPLIMENT TST_PAT AND REPEAT
20530 ;          9192      end;
20531 ;          9193
20532 ;          9194  ENDTST;
20536
20537                                        .SBTTL  $T47
20541 072334  004167  111504          $T47: JSR     R1,$SAVE2                 ;                    9130
20542 072340  012701  052525                MOV     #52525,R1                 ; *,TST.PAT          9168
20543 072344  005002                        CLR     R2                        ; TWICE              9170
20544 072346  152777  000040  120640  1$:   BISB    #40,@ML.REG+40            ;                    9171
20545 072354  016700  121222                MOV     ML.DUT,R0
20546 072360  042700  177770                BIC     #177770,R0
20547 072364  142777  000007  120622        BICB    #7,@ML.REG+40
20548 072372  150077  120616                BISB    R0,@ML.REG+40
20549 072376  152777  000010  120610        BISB    #10,@ML.REG+40            ;                    9173
20550 072404  010167  117170                MOV     R1,IO.BUF                 ; TST.PAT,*          9174
20551 072410  004767  123454                JSR     PC,GD.BLK.XFER            ;                    9175
20552 072414  012777  000061  120532        MOV     #61,@ML.REG               ;                    9176
20553 072422  105777  120576          2$:   TSTB    @ML.REG+50
20554 072426  100375                        BPL     2$
20555 072430  152777  000040  120556        BISB    #40,@ML.REG+40            ;                    9177
20556 072436  016700  121140                MOV     ML.DUT,R0
20557 072442  042700  177770                BIC     #177770,R0
20558 072446  142777  000007  120540        BICB    #7,@ML.REG+40
20559 072454  150077  120534                BISB    R0,@ML.REG+40
20560 072460  152777  000010  120526        BISB    #10,@ML.REG+40            ;                    9179
20561 072466  004767  123376                JSR     PC,GD.BLK.XFER            ;                    9180
20562 072472  012777  000051  120454        MOV     #51,@ML.REG               ;                    9181
20563 072500  105777  120520          3$:   TSTB    @ML.REG+50
20564 072504  100375                        BPL     3$
20565 072506  032777  040000  120500        BIT     #40000,@ML.REG+40         ;                    9184
20566 072514  001430                        BEQ     4$
20567 072516  104455                        TRAP    55                        ;                    9187
20568 072520  000155                        .WORD   155
20569 072522  011026                        .WORD   TRBLE.LOOP
20570 072524  024060                        .WORD   DUMPER
20571 072526  012746  007750                MOV     #FNC.3,-(SP)              ;                    9188
20572 072532  012746  010004                MOV     #FNC.6,-(SP)
20573 072536  012746  007774                MOV     #FNC.5,-(SP)
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                        MOV     #WRD.12,-(SP)
                                        MOV     #WRD.10,-(SP)
                                        MOV     #FNC.4,-(SP)
                                        MOV     #SIX.FMT,-(SP)
                                        MOV     #7,-(SP)
                                        MOV     SP,R0                           ; SP,*
                                        TRAP    14
                                        ADD     #20,SP                          ;                                       9186
                                4$:     COM     R1                              ; TST.PAT                               9191
                                        INC     R2                              ; TWICE                                 9170
                                        CMP     R2,#1                           ; TWICE,*
                                        BLE     1$
                                        RTS     PC                              ;                                       9130

                                ; Routine Size:  87 words
                                ; Maximum stack depth per invocation:  11 words


                                        .SBTTL  T47
                                T47::
                                1$:     JSR     PC,$T47                         ;                                       9192
                                        TRAP    66
                                        ROR     R0
                                        BLO     1$
                                        RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


                ;       9195  !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (98)

```
20625 ;ML4
20626 ;
20627
20628 ;          9196  !
20629 ;          9197  BGNTST;
20630 ;          9198
20631 ;          9199  !++
20632 ;          9200  ! TEST NUMBER:  TST 48
20633 ;          9201  !
20634 ;          9202  ! TEST NAME:    CRC DATA BUS TEST
20635 ;          9203  !
20636 ;          9204  ! TEST DESCRIPTION:
20637 ;          9205  !       TEST THE CRC DATA BUS BETWEEN THE CRC
20638 ;          9206  !       GENERATORS AND THE CRC/MBUS DATA
20639 ;          9207  !       MUX FOR CONTINUITY AND BIT UNIQUENESS
20640 ;          9208  !       BY:
20641 ;          9209  !
20642 ;          9210  !       1.  WHILE IN ECC DIAGNOSTIC MODE DO
20643 ;          9211  !           GOOD BLOCK TRANSFERS WITH VARIOUS
20644 ;          9212  !           CRC_A,CRC_B AND PAR_CRC_WRD WHICH
20645 ;          9213  !           WILL EXERCISE BUS CONTINUITY AND
20646 ;          9214  !           UNIQUENESS.
20647 ;          9215  !
20648 ;          9216  !       2.  THEN IN DATA DIAGNOSTEC MODE READ
20649 ;          9217  !           THE CRC NIBBLES FROM ONE CRC GROUP
20650 ;          9218  !           FOR CORRECT CRC_A,CRC_B AND PAR_CRC_WRD
20651 ;          9219  !           DATA PATTERNS.
20652 ;          9220  !
20653 ;          9221  ! IMPLICIT INPUTS:
20654 ;          9222  !       PD_TEMP
20655 ;          9223  !       A BIT VECTOR OF 16 BITS WHERE THE READ
20656 ;          9224  !       PROM DATA IS STORED OAND ACCESSED FROM.
20657 ;          9225  !
20658 ;          9226  !
20659 ;          9227  !--
20660 ;          9228
20661 ;          9229  local
20662 ;          9230      CRC_NIB,                    !POINTER TO THE CRC NIBBLE
20663 ;          9231      CRC_TSTED,                  !STORES HOW MANY CRC NIBBLES WE HAVE TESTED
20664 ;          9232      ERR_FLG,                    !ERROR FLAG
20665 ;          9233      NIB_PAT;                    !TEST DATA FOR THE CRC NIBBLE
20666 ;          9234
20667 ;          9235  CRC_NIB = 9;                    !SET CRC NIBBLE POINTER
20668 ;          9236
20669 ;          9237  incr LOOP from 0 to 4 do        !REPEAT THE TEST WITH FIVE NIBBLE PATTERNS
20670 ;          9238      begin
20671 ;          9239      BGNSUB;                     !START OF THE SCOPE LOOP
20672 ;          9240      CLR_MBUS;
20673 ;          9241      ECC_DM = ONE;               !SET ECC DIAG MOD
20674 ;          9242
20675 ;          9243      case .LOOP from 0 to 4 of   !SELECT ONE OF THE FIVE NIBBLE PATTERNS
20676 ;          9244          set
20677 ;          9245
20678 ;          9246          [0] :                   !PATTERN 0
20679 ;          9247              NIB_PAT = %b'110';
```

```
20681 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
20682 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (98)
20683 ;
20684 ;          9248
20685 ;          9249          [1] :                                   !PATTERN 1
20686 ;          9250              begin
20687 ;          9251              MLE1 = ONES;
20688 ;          9252              MLE2 = ONES;
20689 ;          9253              NIB_PAT = %b'001';
20690 ;          9254              end;
20691 ;          9255
20692 ;          9256          [2] :                                   !PATTERN 2
20693 ;          9257              begin
20694 ;          9258              CRC_A = ONES;
20695 ;          9259              CRC_B = ONES;
20696 ;          9260              NIB_PAT = %b'000';
20697 ;          9261              end;
20698 ;          9262
20699 ;          9263          [3] :                                   !PATTERN 3
20700 ;          9264              begin
20701 ;          9265              PAR_CRC_WRD = ONES;
20702 ;          9266              CRC_B = ONES;
20703 ;          9267              NIB_PAT = %b'011';
20704 ;          9268              end;
20705 ;          9269
20706 ;          9270          [4] :                                   !PATTERN 4
20707 ;          9271              begin
20708 ;          9272              PAR_CRC_WRD = ONES;
20709 ;          9273              CRC_A = ONES;
20710 ;          9274              NIB_PAT = %b'101';
20711 ;          9275              end;
20712 ;          9276          tes;
20713 ;          9277
20714 ;          9278          GD_BLK_XFER ();                         !SET UP A GOOD BLOCK TRANSFER
20715 ;          9279          MLCS1 = write;                          !DO A WRITE TRANSFER
20716 ;          9280          TIME_OUT_LOOP;                          !WAIT UNTIL DRIVE READY
20717 ;          9281          DAT_DM = ONE;                           !SET DATA DIAG MODE
20718 ;          9282          GD_BLK_XFER ();                         !SET UP A GOOD BLOCK TRANSFER
20719 ;          9283          MLCS1 = read;                           !DO A READ TRANSFER
20720 ;          9284          CRC_TSTED = ZERO;
20721 ;          9285          DELAY (ONE_US);
20722 ;          9286
20723 ;          9287          do                                      !TEST ONE CRC GROUP '6 CRC NIBBLES'
20724 ;          9288              begin
20725 ;          9289              PD_TEMP = .MLPD;                    !READ THE PROM DATA FOR THIS ARRAY WORD
20726 ;          9290              DAT_CLK = ONE;                      !CLOCK OUT AN ARRAY WORD INTO THE DATA DIAG REG'S
20727 ;          9291              DELAY (ONE_US);                     !DELAY ONE MICRO SECOND
20728 ;          9292              RD_LNG_WRD;                         !READ THE DATA DIAG REG'S INTO MEMORY
20729 ;          9293
20730 ;          9294              if .PD_TEMP [.CRC_NIB] IS_NOT_SET   !TEST THIS CRC NIBBLE IF GOOD
20731 ;          9295              then
20732 ;          9296                  begin
20733 ;          9297                  CRC_TSTED = .CRC_TSTED + 1;     !INCREMENT THE GOOD NIBBLE COUNTER
20734 ;          9298                  TST_LNG_WRD (.CRC_NIB, .NIB_PAT, ERR_FLG);  !TEST THE CRC NIBBLE
20735 ;          9299
```

```
20737 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
20738 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (98)
20739
20740 ;          9300              if .ERR_FLG IS_SET                    !SEE IF THE TEST FOUND AN ERROR
20741 ;          9301              then
20742 ;          9302                  begin                             !REPORT ERROR IF FLAG IS SET
20743 ;          9303                  ERRDF (131, SYNC, DUMPER);
20744 ;          9304                  PRINTB (FOR_FMT, WRD_64, WRD_24, WRD_73, WRD_10);
20745 ;          9305                  PRINTB (FMT_5, .NIB_PAT, .NIB_SAVE [NIB_9], 8);
20746 ;          9306                  end;
20747 ;          9307
20748 ;          9308              end;
20749 ;          9309
20750 ;          9310          end
20751 ;          9311      until .CRC_TSTED eql 6;                       !REPEAT UNTIL ONE CRC GROUP HAS BEEN TESTED
20752 ;          9312
20753 ;          9313      ENDSUB;                                       !END OF SCOPE LOOP
20754 ;          9314      end;
20755 ;          9315
20756 ;          9316  ENDTST;
20760
20761                                      .SBTTL  $T48
20765 072626  004167  111264        $T48: JSR     R1,$SAVE5                 ;                                  9194
20766 072632  162706  000006              SUB     #6,SP
20767 072636  012705  000011              MOV     #11,R5                    ; *,CRC.NIB                        9235
20768 072642  010546                      MOV     R5,-(SP)                  ; CRC.NIB,*                        9294
20769 072644  006216                      ASR     (SP)
20770 072646  006216                      ASR     (SP)
20771 072650  006216                      ASR     (SP)
20772 072652  062716  013120              ADD     #PD.TEMP,(SP)
20773 072656  005001                      CLR     R1                        ; LOOP                             9237
20774 072660  104402                1$:   TRAP    2                         ;                                  9238
20775 072662  152777  000040  120324      BISB    #40,@ML.REG+40            ;                                  9239
20776 072670  016704  120706              MOV     ML.DUT,R4
20777 072674  042704  177770              BIC     #177770,R4
20778 072700  142777  000007  120306      BICB    #7,@ML.REG+40
20779 072706  150477  120302              BISB    R4,@ML.REG+40
20780 072712  152777  000001  120354      BISB    #1,@ML.REG+120            ;                                  9241
20781 072720  010104                      MOV     R1,R4                     ; LOOP,*                           9243
20782 072722  006304                      ASL     R4
20783 072724  066407  072730              ADD     2$(R4),PC
20784 072730  000012                2$:   .WORD   3$-2$
20785 072732  000020                      .WORD   4$-2$
20786 072734  000042                      .WORD   5$-2$
20787 072736  000062                      .WORD   6$-2$
20788 072740  000104                      .WORD   7$-2$
20789 072742  012702  000006          3$:   MOV     #6,R2                     ; *,NIB.PAT                        9247
20790 072746  000437                      BR      8$                        ;                                  9243
20791 072750  012777  177777  120346  4$:   MOV     #-1,@ML.REG+150           ;                                  9251
```

```
20793                                ;ML4                                                    14-May-1981 13:48:54    TOPS
20794                                ;                                                       14-May-1981 13:05:08    PA:<
20795
20796 072756 012777 177777 120350        MOV     #-1,@ML.REG+160                 ;                                       9252
20797 072764 012702 000001               MOV     #1,R2                           ; *,NIB.PAT                             9253
20798 072770 000426                      BR      8$                              ;                                       9243
20799 072772 152777 000077 120324 5$:    BISB    #77,@ML.REG+150                 ;                                       9258
20800 073000 152777 000077 120326        BISB    #77,@ML.REG+160                 ;                                       9259
20801 073006 005002                      CLR     R2                              ; NIB.PAT                               9260
20802 073010 000416                      BR      8$                              ;                                       9243
20803 073012 052777 037400 120304 6$:    BIS     #37400,@ML.REG+150              ;                                       9265
20804 073020 152777 000077 120306        BISB    #77,@ML.REG+160                 ;                                       9266
20805 073026 012702 000003               MOV     #3,R2                           ; *,NIB.PAT                             9267
20806 073032 000405                      BR      8$                              ;                                       9243
20807 073034 052777 177777 120262 7$:    BIS     #177777,@ML.REG+150             ;                                       9272
20808 073042 012702 000005               MOV     #5,R2                           ; *,NIB.PAT                             9274
20809 073046 004767 123016       8$:     JSR     PC,GD.BLK.XFER                  ;                                       9278
20810 073052 012777 000061 120074        MOV     #61,@ML.REG                     ;                                       9279
20811 073060 105777 120140       9$:     TSTB    @ML.REG+50
20812 073064 100375                      BPL     9$
20813 073066 152777 000010 120200        BISB    #10,@ML.REG+120                 ;                                       9281
20814 073074 004767 122770               JSR     PC,GD.BLK.XFER                  ;                                       9282
20815 073100 012777 000071 120046        MOV     #71,@ML.REG                     ;                                       9283
20816 073106 005066 000002               CLR     2(SP)                           ; CRC.TSTED                             9284
20817 073112 012703 000001               MOV     #1,R3                           ; *,$$TMP2                              9285
20818 073116 001411              10$:    BEQ     13$
20819 073120 016704 106772               MOV     L$DLY,R4                        ; *,$$TMP1
20820 073124 001404                      BEQ     12$
20821 073126 005066 000006       11$:    CLR     6(SP)                           ; $$TMP
20822 073132 005304                      DEC     R4                              ; $$TMP1
20823 073134 001374                      BNE     11$
20824 073136 005303              12$:    DEC     R3                              ; $$TMP2
20825 073140 000766                      BR      10$
20826 073142 017767 120236 117750 13$:   MOV     @ML.REG+230,PD.TEMP             ;                                       9289
20827 073150 152777 000020 120116        BISB    #20,@ML.REG+120                 ;                                       9290
20828 073156 012703 000001               MOV     #1,R3                           ; *,$$TMP2                              9291
20829 073162 001411              14$:    BEQ     17$
20830 073164 016704 106726               MOV     L$DLY,R4                        ; *,$$TMP1
20831 073170 001404                      BEQ     16$
20832 073172 005066 000006       15$:    CLR     6(SP)                           ; $$TMP
20833 073176 005304                      DEC     R4                              ; $$TMP1
20834 073200 001374                      BNE     15$
20835 073202 005303              16$:    DEC     R3                              ; $$TMP2
20836 073204 000766                      BR      14$
20837 073206 017767 120132 115736 17$:   MOV     @ML.REG+170,D1.TEMP
20838 073214 017767 120134 115732        MOV     @ML.REG+200,D2.TEMP
20839 073222 017767 120106 115726        MOV     @ML.REG+160,E2.TEMP
20840 073230 011646                      MOV     (SP),-(SP)                      ;                                       9294
20841 073232 010546                      MOV     R5,-(SP)                        ; CRC.NIB,*
20842 073234 042716 177770               BIC     #177770,(SP)
20843 073240 012746 000001               MOV     #1,-(SP)
20844 073244 005046                      CLR     -(SP)
20845 073246 004767 107666               JSR     PC,BL$GT2
20846 073252 062706 000010               ADD     #10,SP
```

```
20848                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
20849                                   ;                                                       14-May-1981 13:05:08    PA:<
20850
20851 073256  005700                          TST     R0
20852 073260  001066                          BNE     19$
20853 073262  005266  000002                  INC     2(SP)                   ; CRC.TSTED                             9297
20854 073266  010546                          MOV     R5,-(SP)                ; CRC.NIB,*                             9298
20855 073270  010246                          MOV     R2,-(SP)                ; NIB.PAT,*
20856 073272  012746  000012                  MOV     #12,-(SP)
20857 073276  060616                          ADD     SP,(SP)                 ; ERR.FLG,*
20858 073300  004767  122650                  JSR     PC,TST.LNG.WRD
20859 073304  026627  000012  000001          CMP     12(SP),#1               ; ERR.FLG,*                             9300
20860 073312  001047                          BNE     18$
20861 073314  104455                          TRAP    55                      ;                                       9303
20862 073316  000203                          .WORD   203
20863 073320  010526                          .WORD   SYNC
20864 073322  024060                          .WORD   DUMPER
20865 073324  012746  006406                  MOV     #WRD.10,-(SP)           ;                                       9304
20866 073330  012746  007310                  MOV     #WRD.73,-(SP)
20867 073334  012746  006552                  MOV     #WRD.24,-(SP)
20868 073340  012746  007224                  MOV     #WRD.64,-(SP)
20869 073344  012746  006046                  MOV     #FOR.FMT,-(SP)
20870 073350  012746  000005                  MOV     #5,-(SP)
20871 073354  010600                          MOV     SP,R0                   ; SP,*
20872 073356  1044*4                          TRAP    14
20873 073360  012716  000010                  MOV     #10,(SP)                ;                                       9305
20874 073364  016704  115566                  MOV     NIB.SAVE+4,R4
20875 073370  006204                          ASR     R4
20876 073372  006204                          ASR     R4
20877 073374  006204                          ASR     R4
20878 073376  006204                          ASR     R4
20879 073400  000304                          SWAB    R4
20880 073402  042704  177770                  BIC     #177770,R4
20881 073406  010446                          MOV     R4,-(SP)
20882 073410  010246                          MOV     R2,-(SP)                ; NIB.PAT,*
20883 073412  012746  004430                  MOV     #FMT.5,-(SP)
20884 073416  012746  000004                  MOV     #4,-(SP)
20885 073422  010600                          MOV     SP,R0                   ; SP,*
20886 073424  104414                          TRAP    14
20887 073426  062706  000024                  ADD     #24,SP                  ;                                       9302
20888 073432  062706  000006          18$:    ADD     #6,SP                   ;                                       9296
20889 073436  026627  000002  000006  19$:    CMP     2(SP),#6                ; CRC.TSTED,*                           9311
20890 073444  001236                          BNE     13$
20891 073446  104467                          TRAP    67
20892 073450  006000                          ROR     R0
20893 073452  103002                          BHIS    21$
20894 073454  000167  177200          20$:    JMP     1$
20895 073460  005201                  21$:    INC     R1                      ; LOOP                                  9237
20896 073462  020127  000004                  CMP     R1,#4                   ; LOOP,*
20897 073466  003772                          BLE     20$
20898 073470  062706  000010                  ADD     #10,SP                  ;                                       9194
20899 073474  000207                          RTS     PC
20900
20901                                   ; Routine Size:  215 words
20902                                   ; Maximum stack depth per invocation:  23 words
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
                                        .SBTTL  T48
                                T48::
                                1$:     JSR     PC,$T48                 ;                                       9314
                                        TRAP    66
                                        ROR     R0
                                        BLO     1$
                                        RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words
;       9317  !<BLF/PAGE>
```

```
20938 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
20939 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (99)
20940
20941 ;          9318  !
20942 ;          9319  BGNTST
20943 ;          9320
20944 ;          9321  !++
20945 ;          9322  ! TEST NUMBER:  TST 49
20946 ;          9323  !
20947 ;          9324  ! TEST NAME:    UNIQUE NIBBLE CRC GENERATION TEST
20948 ;          9325  !
20949 ;          9326  ! TEST DESCRIPTION:
20950 ;          9327  !       TEST CRC CODES GENERATED FOR ONE CRC
20951 ;          9328  !       GROUP (52 UNIQUE UNIBUS NIBBLES) BY:
20952 ;          9329  !
20953 ;          9330  !       1.  DOING MASS BUS WRITE TRANSFERSS WITH THE
20954 ;          9331  !       FIRST IO BUF CRC GROUP HAVING 51 NIBBLES
20955 ;          9332  !       OF %B'0000' PATTERN AND THE REMAINING NIBBLE
20956 ;          9333  !           WITH PATTERNS OF %B'0000' TO %B'1111'.
20957 ;          9334  !
20958 ;          9335  !       2.  THEN IN DATA DIAGNOSTIC MODE CALCULATE
20959 ;          9336  !           THE CRC CODE FOR THE FIRST CRC
20960 ;          9337  !           GROUP AND COMPARE IT AGAINST THE
20961 ;          9338  !           HARDWARE GENERATED CRC CODE.
20962 ;          9339  !
20963 ;          9340  !       3.  REPEAT PATTERN OF %B'0000' TO %B'1111'
20964 ;          9341  !           FOR EACH OF THE 52 NIBBLES.
20965 ;          9342  !
20966 ;          9343  ! IMPLICIT INPUTS:
20967 ;          9344  !       IO_BUF
20968 ;          9345  !       A  VECTOR OF 256 WORDS WHERE DATA
20969 ;          9346  !       FOR MBUS READS AND WRITES TRANSFERS
20970 ;          9347  !       IS FOUND.
20971 ;          9348  !
20972 ;          9349  !
20973 ;          9350  !--
20974 ;          9351
20975 ;          9352  local
20976 ;          9353  DODU_FLG ,                              !DROP UNIT FLAG
20977 ;          9354  TEMP ,                                  !TEMPORARY STORAGE LOCATION
20978 ;          9355  NIB_SEL;                                !SELECTS 4 BITS 'ONE NIBBLE' FROM THE IO_BUF
20979 ;          9356  DODU_FLG = ZEROES;                      !CLEAR THE DROP UNIT FLAG
20980 ;          9357
20981 ;          9358  incr CNT from 0 to 13 do                !CLEAR THE FIRST 14 IO_BUF WORDS
20982 ;          9359      IO_BUF [.CNT] = ZEROES;
20983 ;          9360
20984 ;          9361  incr WRD_CNT from 0 to 12 do            !DO THIS TEST ON 13 IO_BUF WORDS
20985 ;          9362      begin
20986 ;          9363      NIB_SEL = -4;                       !RESET THE NIBBLE SELECTOR
20987 ;          9364
20988 ;          9365      incr NIB_TST from 0 to 3 do         !DO THIS TEST ON 4 NIBBLES PER WORD
20989 ;          9366          begin
20990 ;          9367
20991 ;          9368          if (.WRD_CNT eql 12) and (.NIB_TST eql 2) then exitloop;        !THE LAST 2 NIBBLES ARE NOT TESTED
20992 ;          9369
```

```
20994 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
20995 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (99)
20996
20997 ;          9370        NIB_SEL = .NIB_SEL + 4;                  !INCREMENT THE NIBBLE SELECTED
20998 ;          9371        TEMP = ZEROES;                           !CLEAR  TEMP LOCATION
20999 ;          9372
21000 ;          9373        incr NIB_PAT from %b'0000' to %b'1111' by %b'0001' do   !RUN PATTERNS ON THEIS NIBBLE
21001 ;          9374            begin
21002 ;          9375            BGNSUB;                              !START OF SCOPE LOOP
21003 ;          9376            TEMP<.NIB_SEL, 4> = .NIB_PAT;        !LOAD PATTERN INTO TEMP AT THIS NIBBLE
21004 ;          9377            IO_BUF [.WRD_CNT] = .TEMP;           !LOAD THE GENERATED PATTERN INTO THE IO_BUF
21005 ;          9378            CLR_MBUS;
21006 ;          9379            GD_BLK_XFER ();                      !SET UP A GOOD BLOCK TRANSFER
21007 ;          9380            MLCS1 = write;                       !DO A WRITE TRANSFER
21008 ;          9381            TIME_OUT_LOOP;                       !WAIT FOR THE TRANSFER TO COMPLETE
21009 ;          9382            A_GEN = ZEROES;                      !CLEAR THE GEN & CAL STORAGE LOCATIONS
21010 ;          9383            B_GEN = ZEROES;
21011 ;          9384            P_GEN = ZEROES;
21012 ;          9385            A_CAL = ZEROES;
21013 ;          9386            B_CAL = ZEROES;
21014 ;          9387            P_CAL = ZEROES;
21015 ;          9388            CAL_CRC ();                          !CALL ROUTINE TO CALCULATE THE CRC CODE FOR THIS PATTERN
21016 ;          9389
21017 ;          9390            if ERR_CHK_CRC ()                    !NOW SEE IF THE GEN CRC IS SAME AS CAL CRC
21018 ;          9391            then
21019 ;          9392                begin                            !REPORT THE ERROR IF NOT THE SAME
21020 ;          9393                ERRDF (132, SYNC, DUMPER);
21021 ;          9394                PRINTB (THR_FMT, WRD_5, WRD_64, WRD_8);
21022 ;          9395                PRINTB (FMT_19, .B_GEN, .A_GEN, .P_GEN);
21023 ;          9396                PRINTB (FMT_20, .B_CAL, .A_CAL, .P_CAL);
21024 ;          9397                DODU_FLG = ONE;
21025 ;          9398                end;
21026 ;          9399
21027 ;          9400            ENDSUB;                              !END OF SCOPE LOOP
21028 ;          9401            end;
21029 ;          9402
21030 ;          9403        IO_BUF [.WRD_CNT] = ZEROES;              !CLEAR THIS !O_BUF WORD FO NEXT NIBBLE
21031 ;          9404        end;
21032 ;          9405
21033 ;          9406    end;
21034 ;          9407
21035 ;          9408    if .DODU_FLG IS_SET                          !DROP THIS UNIT IF THE DODU FLAG GOT SET
21036 ;          9409    then
21037 ;          9410        begin
21038 ;          9411        DODU (.ML_LUN);
21039 ;          9412        DOCLN;
21040 ;          9413        end;
21041 ;          9414
21042 ;          9415    ENDTST;
21046
21047                                    .SBTTL  $T49
```

```
21055 073512  004167  110400          $T49:   JSR     R1,$SAVE5                       ;                                       9316
21056 073516  024646                          CMP     -(SP),-(SP)
21057 073520  005066  000002                  CLR     2(SP)                           ; DODU.FLG                              9356
21058 073524  005000                          CLR     R0                              ; CNT                                   9358
21059 073526  010001                  1$:     MOV     R0,R1                           ; CNT,*                                 9359
21060 073530  006301                          ASL     R1
21061 073532  005061  011600                  CLR     IO.BUF(R1)
21062 073536  005200                          INC     R0                              ; CNT                                   9358
21063 073540  020027  000015                  CMP     R0,#15                          ; CNT,*
21064 073544  003770                          BLE     1$
21065 073546  005002                          CLR     R2                              ; WRD.CNT                               9361
21066 073550  012716  177774          2$:     MOV     #-4,(SP)                        ; *,NIB.SEL                             9363
21067 073554  010201                          MOV     R2,R1                           ; WRD.CNT,*                             9377
21068 073556  006301                          ASL     R1
21069 073560  005004                          CLR     R4                              ; NIB.TST                               9365
21070 073562  020227  000014          3$:     CMP     R2,#14                          ; WRD.CNT,*                             9368
21071 073566  001003                          BNE     4$
21072 073570  020427  000002                  CMP     R4,#2                           ; NIB.TST,*
21073 073574  001562                          BEQ     8$
21074 073576  062716  000004          4$:     ADD     #4,(SP)                         ; *,NIB.SEL                             9370
21075 073602  005005                          CLR     R5                              ; TEMP                                  9371
21076 073604  005003                          CLR     R3                              ; NIB.PAT                               9373
21077 073606  104402                  5$:     TRAP    2                               ;                                       9374
21078 073610  010546                          MOV     R5,-(SP)                        ; TEMP,*                                9376
21079 073612  016646  000002                  MOV     2(SP),-(SP)                     ; NIB.SEL,*
21080 073616  012746  000004                  MOV     #4,-(SP)
21081 073622  010346                          MOV     R3,-(SP)                        ; NIB.PAT,*
21082 073624  004767  107452                  JSR     PC,BL$PU1
21083 073630  010005                          MOV     R0,R5                           ; *,TEMP                                9374
21084 073632  010561  011600                  MOV     R5,IO.BUF(R1)                   ; TEMP,*                                9377
21085 073636  152777  000040  117350          BISB    #40,@ML.REG+40
21086 073644  016700  117732                  MOV     ML.DUT,R0
21087 073650  042700  177770                  BIC     #177770,R0
21088 073654  142777  000007  117332          BICB    #7,@ML.REG+40
21089 073662  150077  117326                  BISB    R0,@ML.REG+40
21090 073666  004767  122176                  JSR     PC,GD.BLK.XFER                  ;                                       9379
21091 073672  012777  000061  117254          MOV     #61,@ML.REG                     ;                                       9380
21092 073700  105777  117320          6$:     TSTB    @ML.REG+50
21093 073704  100375                          BPL     6$
21094 073706  005067  117234                  CLR     A.GEN                           ;                                       9382
21095 073712  005067  117232                  CLR     B.GEN                           ;                                       9383
21096 073716  005067  117230                  CLR     P.GEN                           ;                                       9384
21097 073722  005067  117212                  CLR     A.CAL                           ;                                       9385
21098 073726  005067  117210                  CLR     B.CAL                           ;                                       9386
21099 073732  005067  117206                  CLR     P.CAL                           ;                                       9387
21100 073736  004767  120650                  JSR     PC,CAL.CRC                      ;                                       9388
21101 073742  004767  121244                  JSR     PC,ERR.CHK.CRC                  ;                                       9390
21102 073746  006000                          ROR     R0
21103 073750  103055                          BCC     7$
21104 073752  104455                          TRAP    55                              ;                                       9393
```

```
21106                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
21107                                   ;                                                       14-May-1981 13:05:08    PA:<
21108
21109 073754  000204                          .WORD   204
21110 073756  010526                          .WORD   SYNC
21111 073760  024060                          .WORD   DUMPER
21112 073762  012746  006360                  MOV     #WRD.8,-(SP)            ;                                       9394
21113 073766  012746  007224                  MOV     #WRD.64,-(SP)
21114 073772  012746  006330                  MOV     #WRD.5,-(SP)
21115 073776  012746  006034                  MOV     #THR.FMT,-(SP)
21116 074002  012746  000004                  MOV     #4,-(SP)
21117 074006  010600                          MOV     SP,R0                   ; SP,*
21118 074010  104414                          TRAP    14
21119 074012  016716  117134                  MOV     P.GEN,(SP)              ;                                       9395
21120 074016  016746  117124                  MOV     A.GEN,-(SP)
21121 074022  016746  117122                  MOV     B.GEN,-(SP)
21122 074026  012746  005412                  MOV     #FMT.19,-(SP)
21123 074032  012746  000004                  MOV     #4,-(SP)
21124 074036  010600                          MOV     SP,R0                   ; SP,*
21125 074040  104414                          TRAP    14
21126 074042  016716  117076                  MOV     P.CAL,(SP)              ;                                       9396
21127 074046  016746  117066                  MOV     A.CAL,-(SP)
21128 074052  016746  117064                  MOV     B.CAL,-(SP)
21129 074056  012746  005462                  MOV     #FMT.20,-(SP)
21130 074062  012746  000004                  MOV     #4,-(SP)
21131 074066  010600                          MOV     SP,R0                   ; SP,*
21132 074070  104414                          TRAP    14
21133 074072  012766  000001  000044          MOV     #1,44(SP)               ; *,DODU.FLG                            9397
21134 074100  062706  000032                  ADD     #32,SP                  ;                                       9392
21135 074104  062706  000010          7$:     ADD     #10,SP                  ;                                       9374
21136 074110  104467                          TRAP    67                      ;                                       9398
21137 074112  006000                          ROR     R0
21138 074114  103634                          BLO     5$
21139 074116  005203                          INC     R3                      ; NIB.PAT                               9373
21140 074120  020327  000017                  CMP     R3,#17                  ; NIB.PAT,*
21141 074124  003630                          BLE     5$
21142 074126  005061  011600                  CLR     IO.BUF(R1)              ;                                       9403
21143 074132  005204                          INC     R4                      ; NIB.TST                               9365
21144 074134  020427  000003                  CMP     R4,#3                   ; NIB.TST,*
21145 074140  003610                          BLE     3$
21146 074142  005202                  8$:     INC     R2                      ; WRD.CNT                               9361
21147 074144  020227  000014                  CMP     R2,#14                  ; WRD.CNT,*
21148 074150  003002                          BGT     9$
21149 074152  000167  177372                  JMP     2$
21150 074156  026627  000002  000001  9$:     CMP     2(SP),#1                ; DODU.FLG,*                            9408
21151 074164  001004                          BNE     10$
21152 074166  016700  117406                  MOV     ML.LUN,R0               ;                                       9411
21153 074172  104451                          TRAP    51
21154 074174  104444                          TRAP    44
21155 074176  022626                  10$:    CMP     (SP)+,(SP)+             ;                                       9316
21156 074200  000207                          RTS     PC
21157
21158                                   ; Routine Size:  156 words
21159                                   ; Maximum stack depth per invocation:  25 words
```

```
21168
21169
21173
21174                                   .SBTTL  T49
21178 074202                    T49::
21179 074202  004767  177304    1$:     JSR     PC,$T49                 ;                       9413
21180 074206  104466                    TRAP    66
21181 074210  006000                    ROR     R0
21182 074212  103773                    BLO     1$
21183 074214  000207                    RTS     PC
21184
21185                           ; Routine Size:  6 words
21186                           ; Maximum stack depth per invocation:  0 words
21191
21192
21193 ;         9416  !
21194 ;         9417  !<BLF/PAGE>
```

```
21196 ;ML4
21197 ;
21198
21199 ;          9418  !
21200 ;          9419  BGNTST;
21201 ;          9420
21202 ;          9421  !++
21203 ;          9422  ! TEST NUMBER:  TST 50
21204 ;          9423  !
21205 ;          9424  ! TEST NAME:            UNIQUE WORD CRC GENERATION TEST
21206 ;          9425  !
21207 ;          9426  ! TEST DESCRIPTION:
21208 ;          9427  !       TEST CRC CODES GENERATED FOR ONE
21209 ;          9428  !       CRC GROUP (13 UNIBUS WORDS) BY:
21210 ;          9429  !
21211 ;          9430  !       1.  DOING MASS BUS WRITE TRANSFERS
21212 ;          9431  !           USING VARIOUS WORD DATA PATTERENS.
21213 ;          9432  !
21214 ;          9433  !       2.  THEN IN DATA DIAGNOSTIC MODE
21215 ;          9434  !           CALCULATE THE CRC CODE FOR THE
21216 ;          9435  !           FIRST CRC GROUP AND COMPARE IT TO
21217 ;          9436  !           THE HARDWARE GENERATED CRC CODE.
21218 ;          9437  !
21219 ;          9438  ! IMPLICIT INPUTS:
21220 ;          9439  !       IO_BUF
21221 ;          9440  !       A  VECTOR OF 256 WORDS WHERE DATA
21222 ;          9441  !       FOR MBUS READS AND WRITES TRANSFERS
21223 ;          9442  !       IS FOUND.
21224 ;          9443  !
21225 ;          9444  !--
21226 ;          9445
21227 ;          9446  local
21228 ;          9447      DODU_FLG,                       !DROP UNIT FLAG
21229 ;          9448      TST_PAT;                        !TEST PATTERN SAVE LOCATION
21230 ;          9449
21231 ;          9450  DODU_FLG = ZEROES;                  !CLEAR THE DROP UNIT FLAG
21232 ;          9451
21233 ;          9452  incr PAT_SEL from 0 to 3 do         !RUN THE TEST ON 4 PATTERNS
21234 ;          9453      begin
21235 ;          9454      BGNSUB;                         !START OF SCOPE LOOP
21236 ;          9455      CLR_MBUS;
21237 ;          9456
21238 ;          9457      case .PAT_SEL from 0 to 3 of    !SELECT ONE OF THE 4 PATTERNS
21239 ;          9458          set
21240 ;          9459
21241 ;          9460          [0] :
21242 ;          9461              TST_PAT = ONES;
21243 ;          9462
21244 ;          9463          [1] :
21245 ;          9464              TST_PAT = %o'052525';
21246 ;          9465
21247 ;          9466          [2] :
21248 ;          9467              TST_PAT = %o'125252';
21249 ;          9468
21250 ;          9469          [3] :
21251 ;ML4
21252 ;
```

```
21253
21254 ;          9470              TST_PAT = %o'070707';
21255 ;          9471          tes;
21256 ;          9472
21257 ;          9473      incr CNT from 0 to 255 do                   !LOAD THE FIRST 13 IO_BUF WORDS WITH TST_PAT
21258 ;          9474          IO_BUF [.CNT] = .TST_PAT;
21259 ;          9475
21260 ;          9476      GD_BLK_XFER ();                             !SET UP A GOOD BLOCK TRANSFER
21261 ;          9477      ML.CS1 = write;                             !DO A WRITE TRANSFER
21262 ;          9478      TIME_OUT_LOOP;                              !WAIT FOR THE TRANSFER TO COMPLETE
21263 ;          9479      A_GEN = ZEROES;                             !CLEAR THE GEN & CAL SAVE LOCATIONS
21264 ;          9480      B_GEN = ZEROES;
21265 ;          9481      P_GEN = ZEROES;
21266 ;          9482      A_CAL = ZEROES;
21267 ;          9483      B_CAL = ZEROES;
21268 ;          9484      P_CAL = ZEROES;
21269 ;          9485      CAL_CRC ();                                 !CALCULATE WHAT THE CRC CODE SHOULD BE
21270 ;          9486
21271 ;          9487      if ERR_CHK_CRC ()                           !NOW SEE IF THE GENERATED CRC CODE IS THE SAME
21272 ;          9488      then
21273 ;          9489          begin                                   !REPORT THE ERROR IF NOT THE SAME
21274 ;          9490          ERRDF (133, SYNC, DUMPER);
21275 ;          9491          PRINTB (THR_FMT, WRD_5, WRD_64, WRD_8);
21276 ;          9492          PRINTB (FMT_19, .B_GEN, .A_GEN, .P_GEN);
21277 ;          9493          PRINTB (FMT_20, .B_CAL, .A_CAL, .P_CAL);
21278 ;          9494          DODU_FLG = ONE;
21279 ;          9495          end;
21280 ;          9496
21281 ;          9497      ENDSUB;                                     !END OF SCOPE LOOP
21282 ;          9498      end;
21283 ;          9499
21284 ;          9500  if .DODU_FLG IS_SET                             !DROP THIS UNIT IF THE DODU FLAG GOT SET
21285 ;          9501  then
21286 ;          9502      begin
21287 ;          9503      DODU (.ML_LUN);
21288 ;          9504      DOCLN;
21289 ;          9505      end;
21290 ;          9506
21291 ;          9507  ENDTST;
21295
21296                                        .SBTTL  $T50
21300 074216  004167  107674          $T50: JSR     R1,$SAVE5                    ;                                  9415
21301 074222  005005                      CLR     R5                           ; DODU.FLG                         9450
21302 074224  005004                      CLR     R4                           ; PAT.SEL                          9452
21303 074226  104402                1$:   TRAP    2                            ;                                  9453
21304 074230  152777  000040  116756      BISB    #40,@ML.REG+40               ;                                  9454
21305 074236  016703  117340              MOV     ML.DUT,R3
21306                               ;ML4                                                  14-May-1981 13:48:54  TOPS
21307                               ;                                                     14-May-1981 13:05:08  PA:<
21308
21309 074242  042703  177770              BIC     #177770,R3
21310 074246  142777  000007  116740      BICB    #7,@ML.REG+40
21311 074254  150377  116734              BISB    R3,@ML.REG+40
21312 074260  010403                      MOV     R4,R3                        ; PAT.SEL,*                        9457
21313 074262  006303                      ASL     R3
21314 074264  066307  074270              ADD     2$(R3),PC
21315 074270  000010                2$:   .WORD   3$-2$
```

```
21316 074272  000016                    .WORD   4$-2$
21317 074274  000024                    .WORD   5$-2$
21318 074276  000032                    .WORD   6$-2$
21319 074300  012701  177777      3$:   MOV     #-1,R1          ; *,TST.PAT                     9461
21320 074304  000410                    BR      7$              ;                               9457
21321 074306  012701  052525      4$:   MOV     #52525,R1       ; *,TST.PAT                     9464
21322 074312  000405                    BR      7$              ;                               9457
21323 074314  012701  125252      5$:   MOV     #-52526,R1      ; *,TST.PAT                     9467
21324 074320  000402                    BR      7$              ;                               9457
21325 074322  012701  070707      6$:   MOV     #70707,R1       ; *,TST.PAT                     9470
21326 074326  005002              7$:   CLR     R2              ; CNT                           9473
21327 074330  010203              8$:   MOV     R2,R3           ; CNT,*                         9474
21328 074332  006303                    ASL     R3
21329 074334  010163  011600            MOV     R1,IO.BUF(R3)   ; TST.PAT,*
21330 074340  005202                    INC     R2              ; CNT                           9473
21331 074342  020227  000377            CMP     R2,#377         ; CNT,*
21332 074346  003770                    BLE     8$
21333 074350  004767  121514            JSR     PC,GD.BLK.XFER  ;                               9476
21334 074354  012777  000061  116572    MOV     #61,@ML.REG     ;                               9477
21335 074362  105777  116636      9$:   TSTB    @ML.REG+50
21336 074366  100375                    BPL     9$
21337 074370  005067  116552            CLR     A.GEN           ;                               9479
21338 074374  005067  116550            CLR     B.GEN           ;                               9480
21339 074400  005067  116546            CLR     P.GEN           ;                               9481
21340 074404  005067  116530            CLR     A.CAL           ;                               9482
21341 074410  005067  116526            CLR     B.CAL           ;                               9483
21342 074414  005067  116524            CLR     P.CAL           ;                               9484
21343 074420  004767  120166            JSR     PC,CAL.CRC      ;                               9485
21344 074424  004767  120562            JSR     PC,ERR.CHK.CRC  ;                               9487
21345 074430  006000                    ROR     R0
21346 074432  103054                    BCC     10$
21347 074434  104455                    TRAP    55              ;                               9490
21348 074436  000205                    .WORD   205
21349 074440  010526                    .WORD   SYNC
21350 074442  024060                    .WORD   DUMPER
21351 074444  012746  006360            MOV     #WRD.8,-(SP)    ;                               9491
21352 074450  012746  007224            MOV     #WRD.64,-(SP)
21353 074454  012746  006330            MOV     #WRD.5,-(SP)
21354 074460  012746  006034            MOV     #THR.FMT,-(SP)
21355 074464  012746  000004            MOV     #4,-(SP)
21356 074470  010600                    MOV     SP,R0           ; SP,*
21357 074472  104414                    TRAP    14
21358 074474  016716  116452            MOV     P.GEN,(SP)      ;                               9492
21359 074500  016746  116442            MOV     A.GEN,-(SP)
21360 074504  016746  116440            MOV     B.GEN,-(SP)
21361                       ;ML4                                  14-May-1981 13:48:54    TOPS
21362                       ;                                     14-May-1981 13:05:08    PA:<
21363
21364 074510  012746  005412            MOV     #FMT.19,-(SP)
21365 074514  012746  000004            MOV     #4,-(SP)
21366 074520  010600                    MOV     SP,R0           ; SP,*
21367 074522  104414                    TRAP    14
21368 074524  016716  116414            MOV     P.CAL,(SP)      ;                               9493
21369 074530  016746  116404            MOV     A.CAL,-(SP)
21370 074534  016746  116402            MOV     B.CAL,-(SP)
21371 074540  012746  005462            MOV     #FMT.20,-(SP)
21372 074544  012746  000004            MOV     #4,-(SP)
```

```
21373 074550 010600                    MOV     SP,R0                           ; SP,*
21374 074552 104414                    TRAP    14
21375 074554 012705 000001             MOV     #1,R5                           ; *,DODU.FLG                    9494
21376 074560 062706 000032             ADD     #32,SP                          ;                               9489
21377 074564 104467             10$:   TRAP    67                              ;                               9495
21378 074566 006000                    ROR     R0
21379 074570 103616                    BLO     1$
21380 074572 005204                    INC     R4                              ; PAT.SEL                       9452
21381 074574 020427 000003             CMP     R4,#3                           ; PAT.SEL,*
21382 074600 003612                    BLE     1$
21383 074602 005305                    DEC     R5                              ; DODU.FLG                      9500
21384 074604 001004                    BNE     11$
21385 074606 016700 116766             MOV     ML.LUN,R0                       ;                               9503
21386 074612 104451                    TRAP    51
21387 074614 104444                    TRAP    44
21388 074616 000207             11$:   RTS     PC                              ;                               9415
21389
21390                                  ; Routine Size:  129 words
21391                                  ; Maximum stack depth per invocation:  19 words
21396
21397
21401
21402                                          .SBTTL  T50
21406 074620                           T50::
21407 074620 004767 177372             1$:     JSR     PC,$T50                 ;                               9505
21408 074624 104466                    TRAP    66
21409 074626 006000                    ROR     R0
21410 074630 103773                    BLO     1$
21411 074632 000207                    RTS     PC
21412
21413                                  ; Routine Size:  6 words
21414                                  ; Maximum stack depth per invocation:  0 words
21422
21423
21424 ;          9508  !<BLF/PAGE>
```

```
21426 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
21427 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (101)
21428
21429 ;          9509  !
21430 ;          9510  BGNTST;
21431 ;          9511
21432 ;          9512  !++
21433 ;          9513  ! TEST NUMBER:  TST 51
21434 ;          9514  !
21435 ;          9515  ! TEST NAME:            CORRECTABLE ERROR SYNDRONE DECODE TEST
21436 ;          9516  !
21437 ;          9517  ! TEST DESCRIPTION:
21438 ;          9518  !       TEST SYNDRONE DECODE AND ERROR
21439 ;          9519  !       CORRECTION TO DECODE AND CORRECT
21440 ;          9520  !       SINGLE BIT AND MULTIPLE BIT
21441 ;          9521  !       CHANNEL ERRORS BY:
21442 ;          9522  !
21443 ;          9523  !       1.  VIA ECC DIAG MODE FORCE SYNDRONE
21444 ;          9524  !           BITS TO DECODE SINGLE BIT AND
21445 ;          9525  !           MULTIPLE BIT CHANNEL ERRORS.
21446 ;          9526  !
21447 ;          9527  !       2.  THEN DO A MASS BUS READ TRANSFER
21448 ;          9528  !           AND EXAM THE IO_BUF FOR CORRECT
21449 ;          9529  !           BIT COMPLIMENTING.
21450 ;          9530  !
21451 ;          9531  ! IMPLICIT INPUTS:
21452 ;          9532  !       IO_BUF
21453 ;          9533  !       A  VECTOR OF 256 WORDS WHERE DATA
21454 ;          9534  !       FOR MBUS READS AND WRITES TRANSFERS
21455 ;          9535  !       IS FOUND.
21456 ;          9536  !
21457 ;          9537  !
21458 ;          9538  !--
21459 ;          9539
21460 ;          9540  local
21461 ;          9541      BITS_XFERED;                        !POINTS TO THE CHANNEL BEING TESTED
21462 ;          9542
21463 ;          9543  BAI = ONE;                              !BEFORE WE START LETS CLEAR OUT THE ML11'S
21464 ;          9544  IO_BUF = ZEROES;                        !GOOD BLOCK BY WRITTING ZEROES TO IT
21465 ;          9545  GD_BLK_XFER ();
21466 ;          9546  ML[S1 = write;
21467 ;          9547  TIME_OUT_LOOP;
21468 ;          9548  BITS_XFERED = -1;                       !RESET THE CHANNEL POINTER
21469 ;          9549
21470 ;          9550  incr PLOG from 0 to 5 do                !TEST ONE CRC GROUP '6 ARRAY WORDS'
21471 ;          9551      begin
21472 ;          9552
21473 ;          9553      incr CHANNEL from 0 to 35 do        !TEST 36 BITS IN EACH ARRAY WORD
21474 ;          9554          begin
21475 ;          9555          BGNSUB;                         !START OF SCOPE LOOP
21476 ;          9556          CLR_MBUS;                       !CLEAR THE DRIVE
21477 ;          9557          BITS_XFERED = .BITS_XFERED + 1; !INCREMENT THE CHANNEL POINTER
21478 ;          9558
21479 ;          9559              incr CNT from 0 to 255 do   !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
21480 ;          9560                  IO_BUF [.CNT] = ZEROES;
```

```
21482 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
21483 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (101)
21484 ;
21485 ;          9561
21486 ;          9562          FORCE_REM (.PLOG, .CHANNEL);              !FORCE THIS BIT IN THIS WORD IN ERROR
21487 ;          9563          GD_BLK_XFER ();                           !SET UP A GOOD BLOCK TRANSFER
21488 ;          9564          ECC_DIS = ZERO;                           !CLEAR ECC DISABLE
21489 ;          9565          MLCS1 = read;                             !DO A READ TRANSFER
21490 ;          9566          TIME_OUT_LOOP;                            !WAIT FOR THE TRANSFER TO COMPLETE
21491 ;          9567
21492 ;          9568          if not FIND_COMP_BIT (.BITS_XFERED)       !SEARCH THE IO_BUF FOR THE COMP BIT
21493 ;          9569          then
21494 ;          9570              begin                                 !REPORT AN ERROR IF THIS BIT IS NOT COMP
21495 ;          9571              ERRDF (134, SYNC, DUMPER);
21496 ;          9572              PRINTB (THR_FMT, WRD_74, WRD_75, PHR_1);
21497 ;          9573              PRINTB (FMT_21, .PLOG, .CHANNEL);
21498 ;          9574              end;
21499 ;          9575
21500 ;          9576          incr WRD_CNT from 0 to 12 do              !SEE IF ANY OTHER BITS GOT COMP'ED
21501 ;          9577
21502 ;          9578              if .IO_BUF [.WRD_CNT] neq ZEROES      !TEST THE IO_BUF FOR ZEROES
21503 ;          9579              then
21504 ;          9580                  begin                             !REPORT AN ERROR IF ANY OTHERS ARE SET
21505 ;          9581                  ERRDF (135, SYNC, DUMPER);
21506 ;          9582                  PRINTB (FOR_FMT, WRD_61, WRD_74, WRD_75, PHR_5);
21507 ;          9583                  PRINTB (FMT_21, .PLOG, .CHANNEL);
21508 ;          9584                  end;
21509 ;          9585
21510 ;          9586              ENDSUB;                               !END OF SCOPE LOOP
21511 ;          9587              end;
21512 ;          9588
21513 ;          9589          end;
21514 ;          9590
21515 ;          9591      BITS_XFERED = -1;                             !RESET THE CHANNEL POINTER
21516 ;          9592
21517 ;          9593      incr CHANNEL from 0 to 35 do                  !TEST 36 CHANNELS FOR MULTIPLE BIT ERRORS
21518 ;          9594          begin
21519 ;          9595          BGNSUB;                                   !START OF SCOPE LOOP
21520 ;          9596          CLR_MBUS;                                 !CLEAR THE DRIVE
21521 ;          9597          BITS_XFERED = .BITS_XFERED + 1;           !INCREMENT THE CHANNEL POINTER
21522 ;          9598
21523 ;          9599          incr CNT from 0 to 20 do                  !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
21524 ;          9600              IO_BUF [.CNT] = ZEROES;
21525 ;          9601
21526 ;          9602          FORCE_REM (58, .CHANNEL);                 !FORCE ALL 6 BITS IN THIS CHANNEL IN ERROR
21527 ;          9603          GD_BLK_XFER ();                           !SET UP A GOOD BLOCK TRANSFER
21528 ;          9604          ECC_DIS = ZERO;                           !CLEAR ECC DISABLE
21529 ;          9605          MLCS1 = read;                             !DO A READ TRANSFER
21530 ;          9606          TIME_OUT_LOOP;                            !WAIT FOR THE TRANSFER TO CMOPLETE
21531 ;          9607
21532 ;          9608          incr BIT_OFFSET from 0 to 180 by 36 do    !SEE IF EVERY 36TH BIT GOT COMP'ED
21533 ;          9609
21534 ;          9610              if not FIND_COMP_BIT (.BITS_XFERED + .BIT_OFFSET)       !SEARCH THE IO_BUF FOR THE COMP'ED BITS
21535 ;          9611              then
21536 ;          9612                  begin                             !REPORT AN ERROR IF ANY OF THE BITS ARE NOT COMP'ED
```

```
21538 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
21539 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (101)
21540
21541 ;          9613              ERRDF (134, SYNC, DUMPER);
21542 ;          9614              PRINTB (THR_FMT, WRD_74, WRD_75, PHR_1);
21543 ;          9615              PRINTB (FMT_21, 58, .CHANNEL);
21544 ;          9616              end;
21545 ;          9617
21546 ;          9618          incr WRD_CNT from 0 to 12 do            !ALSO SEE IF ANY OTHER BIT GOT COMP'ED
21547 ;          9619
21548 ;          9620              if .IO_BUF [.WRD_CNT] neq ZEROES    !TEST THE IO_BUF FOR ALL ZEROES
21549 ;          9621              then
21550 ;          9622                  begin                           !REPORT AN ERROR IF ANY OTHERS ARE COMP'ED
21551 ;          9623                  ERRDF (135, SYNC, DUMPER);
21552 ;          9624                  PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
21553 ;          9625                  PRINTB (FMT_21, 58, .CHANNEL);
21554 ;          9626                  end;
21555 ;          9627
21556 ;          9628          ENDSUB;                                 !END OF SCOPE LOOP
21557 ;          9629          end;
21558 ;          9630
21559 ;          9631      ENDTST;
21563
21564                                          .SBTTL  $T51
21568 074634  004167  107256          $T51:   JSR     R1,$SAVE5                       ;                       9507
21569 074640  152777  000010  116346          BISB    #10,@ML.REG+40                  ;                       9543
21570 074646  005067  114726                  CLR     IO.BUF                          ;                       9544
21571 074652  004767  121212                  JSR     PC,GD.BLK.XFER                  ;                       9545
21572 074656  012777  000061  116270          MOV     #61,@ML.REG                     ;                       9546
21573 074664  105777  116334          1$:     TSTB    @ML.REG+50
21574 074670  100375                          BPL     1$
21575 074672  012705  177777                  MOV     #-1,R5                          ; *,BITS.XFERED         9548
21576 074676  005004                          CLR     R4                              ; PLOG                  9550
21577 074700  005003                  2$:     CLR     R3                              ; CHANNEL               9553
21578 074702  104402                  3$:     TRAP    2                               ;                       9554
21579 074704  152777  000040  116302          BISB    #40,@ML.REG+40                  ;                       9555
21580 074712  016702  116664                  MOV     ML.DUT,R2
21581 074716  042702  177770                  BIC     #177770,R2
21582 074722  142777  000007  116264          BICB    #7,@ML.REG+40
21583 074730  150277  116260                  BISB    R2,@ML.REG+40
21584 074734  005205                          INC     R5                              ; BITS.XFERED           9557
21585 074736  005001                          CLR     R1                              ; CNT                   9559
21586 074740  010102                  4$:     MOV     R1,R2                           ; CNT,*                 9560
21587 074742  006302                          ASL     R2
21588 074744  005062  011600                  CLR     IO.BUF(R2)
21589 074750  005201                          INC     R1                              ; CNT                   9559
21590 074752  020127  000377                  CMP     R1,#377                         ; CNT,*
21591 074756  003770                          BLE     4$
21592 074760  010446                          MOV     R4,-(SP)                        ; PLOG,*                9562
```

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21594                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
21595                                   ;                                                       14-May-1981 13:05:08    PA:<
21596
21597 074762  010346                           MOV     R3,-(SP)                ; CHANNEL,*
21598 074764  004767  120612                   JSR     PC,FORCE.REM
21599 074770  004767  121074                   JSR     PC,GD.BLK.XFER          ;                                       9563
21600 074774  142777  000002  116272           BICB    #2,@ML.REG+120          ;                                       9564
21601 075002  012777  000071  116144           MOV     #71,@ML.REG             ;                                       9565
21602 075010  105777  116210           5$:     TSTB    @ML.REG+50
21603 075014  100375                           BPL     5$
21604 075016  010546                           MOV     R5,-(SP)                ; BITS.XFERED,*                         9568
21605 075020  004767  120404                   JSR     PC,FIND.COMP.BIT
21606 075024  005726                           TST     (SP)+
21607 075026  006000                           ROR     R0
21608 075030  103432                           BLO     6$
21609 075032  104455                           TRAP    55                      ;                                       9571
21610 075034  000206                           .WORD   206
21611 075036  010526                           .WORD   SYNC
21612 075040  024060                           .WORD   DUMPER
21613 075042  012746  007366                   MOV     #PHR.1,-(SP)            ;                                       9572
21614 075046  012746  007330                   MOV     #WRD.75,-(SP)
21615 075052  012746  007316                   MOV     #WRD.74,-(SP)
21616 075056  012746  006034                   MOV     #THR.FMT,-(SP)
21617 075062  012746  000004                   MOV     #4,-(SP)
21618 075066  010600                           MOV     SP,R0                   ; SP,*
21619 075070  104414                           TRAP    14
21620 075072  010316                           MOV     R3,(SP)                 ; CHANNEL,*                             9573
21621 075074  010446                           MOV     R4,-(SP)                ; PLOG,*
21622 075076  012746  005534                   MOV     #FMT.21,-(SP)
21623 075102  012746  000003                   MOV     #3,-(SP)
21624 075106  010600                           MOV     SP,R0                   ; SP,*
21625 075110  104414                           TRAP    14
21626 075112  062706  000020                   ADD     #20,SP                  ;                                       9570
21627 075116  005001                   6$:     CLR     R1                      ; WRD.CNT                               9576
21628 075120  010102                   7$:     MOV     R1,R2                   ; WRD.CNT,*                             9578
21629 075122  006302                           ASL     R2
21630 075124  005762  011600                   TST     IO.BUF(R2)
21631 075130  001434                           BEQ     8$
21632 075132  104455                           TRAP    55                      ;                                       9581
21633 075134  000207                           .WORD   207
21634 075136  010526                           .WORD   SYNC
21635 075140  024060                           .WORD   DUMPER
21636 075142  012746  007472                   MOV     #PHR.5,-(SP)            ;                                       9582
21637 075146  012746  007330                   MOV     #WRD.75,-(SP)
21638 075152  012746  007316                   MOV     #WRD.74,-(SP)
21639 075156  012746  007174                   MOV     #WRD.61,-(SP)
21640 075162  012746  006046                   MOV     #FOR.FMT,-(SP)
21641 075166  012746  000005                   MOV     #5,-(SP)
21642 075172  010600                           MOV     SP,R0                   ; SP,*
21643 075174  104414                           TRAP    14
21644 075176  010316                           MOV     R3,(SP)                 ; CHANNEL,*                             9583
21645 075200  010446                           MOV     R4,-(SP)                ; PLOG,*
21646 075202  012746  005534                   MOV     #FMT.21,-(SP)
21647 075206  012746  000003                   MOV     #3,-(SP)
21648 075212  010600                           MOV     SP,R0                   ; SP,*
```

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21650                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
21651                                   ;                                                       14-May-1981 13:05:08    PA:<
21652
21653 075214  104414                          TRAP    14
21654 075216  062706  000022                    ADD     #22,SP                  ;                                       9580
21655 075222  005201                    8$:   INC     R1                      ; WRD.CNT                               9576
21656 075224  020127  000014                    CMP     R1,#14                  ; WRD.CNT,*
21657 075230  003733                          BLE     7$
21658 075232  022626                          CMP     (SP)+,(SP)+             ;                                       9554
21659 075234  104467                          TRAP    67                      ;                                       9584
21660 075236  006000                          ROR     R0
21661 075240  103620                          BLO     3$
21662 075242  005203                          INC     R3                      ; CHANNEL                               9553
21663 075244  020327  000043                    CMP     R3,#43                  ; CHANNEL,*
21664 075250  003614                          BLE     3$
21665 075252  005204                          INC     R4                      ; PLOG                                  9550
21666 075254  020427  000005                    CMP     R4,#5                   ; PLOG,*
21667 075260  003607                          BLE     2$
21668 075262  012705  177777                    MOV     #-1,R5                  ; *,BITS.XFERED                         9591
21669 075266  005003                          CLR     R3                      ; CHANNEL                               9593
21670 075270  104402                    9$:   TRAP    2                       ;                                       9594
21671 075272  152777  000040  115714          BISB    #40,@ML.REG+40          ;                                       9595
21672 075300  016704  116276                    MOV     ML.DUT,R4
21673 075304  042704  177770                    BIC     #177770,R4
21674 075310  142777  000007  115676          BICB    #7,@ML.REG+40
21675 075316  150477  115672                    BISB    R4,@ML.REG+40
21676 075322  005205                          INC     R5                      ; BITS.XFERED                           9597
21677 075324  005001                          CLR     R1                      ; CNT                                   9599
21678 075326  010102                    10$:  MOV     R1,R2                   ; CNT,*                                 9600
21679 075330  006302                          ASL     R2
21680 075332  005062  011600                    CLR     IO.BUF(R2)
21681 075336  005201                          INC     R1                      ; CNT                                   9599
21682 075340  020127  000024                    CMP     R1,#24                  ; CNT,*
21683 075344  003770                          BLE     10$
21684 075346  012746  000072                    MOV     #72.,-(SP)              ;                                       9602
21685 075352  010346                          MOV     R3,-(SP)                ; CHANNEL,*
21686 075354  004767  120222                    JSR     PC,FORCE.REM
21687 075360  004767  120504                    JSR     PC,GD.BLK.XFER          ;                                       9603
21688 075364  142777  000002  115702          BICB    #2,@ML.REG+120          ;                                       9604
21689 075372  012777  000071  115554          MOV     #71,@ML.REG             ;                                       9605
21690 075400  105777  115620              11$:  TSTB    @ML.REG+50
21691 075404  100375                          BPL     11$
21692 075406  005002                          CLR     R2                      ; BIT.OFFSET                            9608
21693 075410  010246                    12$:  MOV     R2,-(SP)                ; BIT.OFFSET,*                          9610
21694 075412  060516                          ADD     R5,(SP)                 ; BITS.XFERED,*
21695 075414  004767  120010                    JSR     PC,FIND.COMP.BIT
21696 075420  005726                          TST     (SP)+
21697 075422  006000                          ROR     R0
21698 075424  103433                          BLO     13$
21699 075426  104455                          TRAP    55                      ;                                       9613
21700 075430  000206                          .WORD   206
21701 075432  010526                          .WORD   SYNC
21702 075434  024060                          .WORD   DUMPER
21703 075436  012746  007366                    MOV     #PHR.1,-(SP)            ;                                       9614
21704 075442  012746  007330                    MOV     #WRD.75,-(SP)
```

```
21706                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
21707                                   ;                                                       14-May-1981 13:05:08    PA:<
21708
21709 075446  012746  007316                     MOV     #WRD.74,-(SP)
21710 075452  012746  006034                     MOV     #THR.FMT,-(SP)
21711 075456  012746  000004                     MOV     #4,-(SP)
21712 075462  010600                             MOV     SP,R0                   ; SP,*
21713 075464  104414                             TRAP    14
21714 075466  010316                             MOV     R3,(SP)                 ; CHANNEL,*                             9615
21715 075470  012746  000072                     MOV     #72,-(SP)
21716 075474  012746  005534                     MOV     #FMT.21,-(SP)
21717 075500  012746  000003                     MOV     #3,-(SP)
21718 075504  010600                             MOV     SP,R0                   ; SP,*
21719 075506  104414                             TRAP    14
21720 075510  062706  000020                     ADD     #20,SP                  ;                                       9612
21721 075514  062702  000044          13$:       ADD     #44,R2                  ; *,BIT.OFFSET                          9608
21722 075520  020227  000264                     CMP     R2,#264                 ; BIT.OFFSET,*
21723 075524  003731                             BLE     12$
21724 075526  005001                             CLR     R1                      ; WRD.CNT                               9618
21725 075530  010102          14$:       MOV     R1,R2                   ; WRD.CNT,*                             9620
21726 075532  006302                             ASL     R2
21727 075534  005762  011600                     TST     IO.BUF(R2)
21728 075540  001437                             BEQ     15$
21729 075542  104455                             TRAP    55                      ;                                       9623
21730 075544  000207                             .WORD   207
21731 075546  010526                             .WORD   SYNC
21732 075550  024060                             .WORD   DUMPER
21733 075552  012746  007240                     MOV     #WRD.67,-(SP)           ;                                       9624
21734 075556  012746  006426                     MOV     #WRD.12,-(SP)
21735 075562  012746  007330                     MOV     #WRD.75,-(SP)
21736 075566  012746  007316                     MOV     #WRD.74,-(SP)
21737 075572  012746  007174                     MOV     #WRD.61,-(SP)
21738 075576  012746  006062                     MOV     #FIV.FMT,-(SP)
21739 075602  012746  000006                     MOV     #6,-(SP)
21740 075606  010600                             MOV     SP,R0                   ; SP,*
21741 075610  104414                             TRAP    14
21742 075612  010316                             MOV     R3,(SP)                 ; CHANNEL,*                             9625
21743 075614  012746  000072                     MOV     #72,-(SP)
21744 075620  012746  005534                     MOV     #FMT.21,-(SP)
21745 075624  012746  000003                     MOV     #3,-(SP)
21746 075630  010600                             MOV     SP,R0                   ; SP,*
21747 075632  104414                             TRAP    14
21748 075634  062706  000024                     ADD     #24,SP                  ;                                       9622
21749 075640  005201          15$:       INC     R1                      ; WRD.CNT                               9618
21750 075642  020127  000014                     CMP     R1,#14                  ; WRD.CNT,*
21751 075646  003730                             BLE     14$
21752 075650  022626                             CMP     (SP)+,(SP)+             ;                                       9594
21753 075652  104467                             TRAP    67                      ;                                       9626
21754 075654  006000                             ROR     R0
21755 075656  103604                             BLO     9$
21756 075660  005203                             INC     R3                      ; CHANNEL                               9593
21757 075662  020327  000043                     CMP     R3,#43                  ; CHANNEL,*
21758 075666  003600                             BLE     9$
21759 075670  000207                             RTS     PC                      ;                                       9507
21760
```

```
21762                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
21763                                   ;                                                       14-May-1981 13:05:08    PA:<
21764
21765                                   ; Routine Size:  271 words
21766                                   ; Maximum stack depth per invocation:  18 words
21771
21772
21776
21777                                           .SBTTL  T51
21781 075672                            T51::
21782 075672  004767  176736            1$:     JSR     PC,$T51                         ;       9629
21783 075676  104466                            TRAP    66
21784 075700  006000                            ROR     R0
21785 075702  103773                            BLO     1$
21786 075704  000207                            RTS     PC
21787
21788                                   ; Routine Size:  6 words
21789                                   ; Maximum stack depth per invocation:  0 words
21794
21795
21796 ;         9632  !<BLF/PAGE>
```

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21798 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
21799 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (102)
21800
21801 ;          9633  !
21802 ;          9634  BGNTST;
21803 ;          9635
21804 ;          9636  !++
21805 ;          9637  ! TEST NUMBER:  TST 52
21806 ;          9638  !
21807 ;          9639  ! TEST NAME:            UNCORRECTABLE ERROR SYNDRONE DECODE TEST AT CHANNELS > 35
21808 ;          9640  !
21809 ;          9641  ! TEST DESCRIPTION:
21810 ;          9642  !       TEST SYNDRONE DECODE TO DETECT BUT
21811 ;          9643  !       NOT CORRECT UNCORRECTABLE CHANNEL
21812 ;          9644  !       ERRORS BY:
21813 ;          9645  !
21814 ;          9646  !       1.  VIA ECC DIAG MODE FORCE SYNDRONE
21815 ;          9647  !           BITS TO INDICATE CHANNEL ERRORS
21816 ;          9648  !           AT WORDS OF A CRC GROUP BUT AT CHANNELS
21817 ;          9649  !           GREATER THAN 35.
21818 ;          9650  !
21819 ;          9651  !       2.  DO A MASS BUS READ TRANSFER
21820 ;          9652  !
21821 ;          9653  !       3.  THEN EXAMIN THE IO BUF FOR NO
21822 ;          9654  !           BITS COMPLIMENTED AND ECH  AND
21823 ;          9655  !           BITS SET
21824 ;          9656  !
21825 ;          9657  ! IMPLICIT INPUTS:
21826 ;          9658  !       IO_BUF
21827 ;          9659  !       A  VECTOR OF 256 WORDS WHERE DATA
21828 ;          9660  !       FOR MBUS READS AND WRITES TRANSFERS
21829 ;          9661  !       IS FOUND.
21830 ;          9662  !
21831 ;          9663  !
21832 ;          9664  !--
21833 ;          9665
21834 ;          9666  local
21835 ;          9667      PLOG;                                !INDEX INTO REMAINDER TABLE 'REM_TBL'
21836 ;          9668
21837 ;          9669  BAI = ONE;                               !FIRST LETS CLEAR THE ML11'S GOOD BLOCK
21838 ;          9670  IO_BUF = ZEROES;                         !BY WRITING ZEROES TO IT
21839 ;          9671  GD_BLK_XFER ();
21840 ;          9672  MLCS1 = write;
21841 ;          9673  TIME_OUT_LOOP;
21842 ;          9674
21843 ;          9675  incr PLOG_SEL from 0 to 6 do             !TEST SYNDRONE DECODE AT 7 DIFFERENT PLOG VALUES
21844 ;          9676      begin
21845 ;          9677
21846 ;          9678      case .PLOG_SEL from 0 to 6 of        !SELECT A PLOG VALUE
21847 ;          9679          set
21848 ;          9680
21849 ;          9681          [0] :                            !POINTS TO WORD 0 IN THE CRC GROUP
21850 ;          9682              PLOG = 0;
21851 ;          9683
21852 ;          9684          [1] :                            !POINTS TO WORD 1 IN THE CRC GROUP
21853 ;ML4                                                     14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
21854 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (102)
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```
21855
21856 ;          9685              PLOG = 1;
21857 ;          9686
21858 ;          9687          [2] :                                   !POINTS TO WORD 2 IN THE CRC GROUP
21859 ;          9688              PLOG = 2;
21860 ;          9689
21861 ;          9690          [3] :                                   !POINTS TO WORD 3 IN THE CRC GROUP
21862 ;          9691              PLOG = 3;
21863 ;          9692
21864 ;          9693          [4] :                                   !POINTS TO WORD 4 IN THE CRC GROUP
21865 ;          9694              PLOG = 4;
21866 ;          9695
21867 ;          9696          [5] :                                   !POINTS TO WORD 5 IN THE CRC GROUP
21868 ;          9697              PLOG = 5;
21869 ;          9698
21870 ;          9699          [6] :                                   !POINTS TO ALL 6 WORDS IN THE CRC GROUP
21871 ;          9700              PLOG = 58;
21872 ;          9701          tes;
21873 ;          9702
21874 ;          9703      incr CHANNEL from 36 to 62 do               !TEST AT CHANNELS > 35 TO FORCE UNCORRECTABLE ERROR
21875 ;          9704          begin
21876 ;          9705          BGNSUB;                                 !START OF SCOPE LOOP
21877 ;          9706          CLR_MBUS;                               !CLEAR THE DRIVE
21878 ;          9707
21879 ;          9708          incr COUNT from 0 to 255 do             !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
21880 ;          9709              IO_BUF [.COUNT] = ZEROES;
21881 ;          9710
21882 ;          9711          FORCE_REM (.PLOG, .CHANNEL);            !FORCE UNCORRECTABLE ERROR AT THIS WORD AND CHANNEL
21883 ;          9712          GD_BLK_XFER ();                         !SET UP A GOOD BLOCK TRANSFER
21884 ;          9713          ECC_DIS = ZERO;                         !CLEAR ECC DISABLE
21885 ;          9714          MLCS1 = read;                           !DO A READ TRANSFER
21886 ;          9715          TIME_OUT_LOOP;                          !WAIT FOR THE  TRANSFER TO COMPLETE
21887 ;          9716
21888 ;          9717          if not ((.ECH_ERR) and (.UNC_ERR))      !SEE IF THE ERROR WAS DETECTED
21889 ;          9718          then
21890 ;          9719              begin                               !ERROR IF NOT DECTECTED
21891 ;          9720              ERRDF (136, SYNC, DUMPER);
21892 ;          9721              PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_76, WRD_9);
21893 ;          9722              PRINTB (FMT_21, .PLOG, .CHANNEL);
21894 ;          9723              end;
21895 ;          9724
21896 ;          9725          incr CNT from 0 to 12 do                !SEE IF ANY CORRECTION WAS DONE
21897 ;          9726
21898 ;          9727              if .IO_BUF [.CNT] neq ZEROES        !SEARCH THE IO_BUF FOR ALL ZEROES
21899 ;          9728              then
21900 ;          9729                  begin                           !REPORT AN ERROR IF ANY CORRECTION WAS DONE
21901 ;          9730                  ERRDF (137, SYNC, DUMPER);
21902 ;          9731                  PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
21903 ;          9732                  PRINTB (FMT_21, .PLOG, .CHANNEL);
21904 ;          9733                  end;
21905 ;          9734
21906 ;          9735          ENDSUB;                                 !END OF SCOPE LOOP
21907 ;          9736          end;
21908 ;ML4                                                            14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
21909 ;                                                               14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (102)
21910
21911 ;          9737
```

```
21912 ;          9738      end;
21913 ;          9739
21914 ;          9740  ENDTST;
21918
21919                                        .SBTTL  $T52
21923 075706  004167  106204                $T52:   JSR     R1,$SAVE5                ;                                  9631
21924 075712  152777  000010  115274                BISB    #10,@ML.REG+40           ;                                  9669
21925 075720  005067  113654                        CLR     IO.BUF                   ;                                  9670
21926 075724  004767  120140                        JSR     PC,GD.BLK.XFER           ;                                  9671
21927 075730  012777  000061  115216                MOV     #61,@ML.REG              ;                                  9672
21928 075736  105777  115262                1$:     TSTB    @ML.REG+50
21929 075742  100375                               BPL     1$
21930 075744  005005                               CLR     R5                       ; PLOG.SEL                         9675
21931 075746  010504                        2$:     MOV     R5,R4                    ; PLOG.SEL,*                       9678
21932 075750  006304                               ASL     R4
21933 075752  066407  075756                        ADD     3$(R4),PC
21934 075756  000016                        3$:     .WORD   4$-3$
21935 075760  000022                                .WORD   5$-3$
21936 075762  000030                                .WORD   6$-3$
21937 075764  000036                                .WORD   7$-3$
21938 075766  000044                                .WORD   8$-3$
21939 075770  000052                                .WORD   9$-3$
21940 075772  000060                                .WORD   10$-3$
21941 075774  005003                        4$:     CLR     R3                       ; PLOG                             9682
21942 075776  000421                               BR      11$                      ;                                  9678
21943 076000  012703  000001                5$:     MOV     #1,R3                    ; *,PLOG                           9685
21944 076004  000416                               BR      11$                      ;                                  9678
21945 076006  012703  000002                6$:     MOV     #2,R3                    ; *,PLOG                           9688
21946 076012  000413                               BR      11$                      ;                                  9678
21947 076014  012703  000003                7$:     MOV     #3,R3                    ; *,PLOG                           9691
21948 076020  000410                               BR      11$                      ;                                  9678
21949 076022  012703  000004                8$:     MOV     #4,R3                    ; *,PLOG                           9694
21950 076026  000405                               BR      11$                      ;                                  9678
21951 076030  012703  000005                9$:     MOV     #5,R3                    ; *,PLOG                           9697
21952 076034  000402                               BR      11$                      ;                                  9678
21953 076036  012703  000072                10$:    MOV     #72,R3                   ; *,PLOG                           9700
21954 076042  012704  000044                11$:    MOV     #44,R4                   ; *,CHANNEL                        9703
21955 076046  104402                        12$:    TRAP    2                        ;                                  9704
21956 076050  152777  000040  115136                BISB    #40,@ML.REG+40           ;                                  9705
21957 076056  016702  115520                        MOV     ML.DUT,R2
21958 076062  042702  177770                        BIC     #177770,R2
21959 076066  142777  000007  115120                BICB    #7,@ML.REG+40
21960 076074  150277  115114                        BISB    R2,@ML.REG+40
21961 076100  005001                               CLR     R1                       ; COUNT                            9708
21962 076102  010102                        13$:    MOV     R1,R2                    ; COUNT,*                          9709
21963                                       ;ML4                                                 14-May-1981 13:48:54  TOPS
21964                                       ;                                                    14-May-1981 13:05:08  PA:<
21965
21966 076104  006302                               ASL     R2
21967 076106  005062  011600                        CLR     IO.BUF(R2)
21968 076112  005201                               INC     R1                       ; COUNT                            9708
21969 076114  020127  000377                        CMP     R1,#377                  ; COUNT,*
21970 076120  003770                               BLE     13$
21971 076122  010346                               MOV     R3,-(SP)                 ; PLOG,*                           9711
21972 076124  010446                               MOV     R4,-(SP)                 ; CHANNEL,*
21973 076126  004767  117450                        JSR     PC,FORCE.REM
21974 076132  004767  117732                        JSR     PC,GD.BLK.XFER           ;                                  9712
```

```
                                                                                                                    D 3
 21975 076136  142777  000002  115130          BICB    #2,@ML.REG+120                  ;                                  9713
 21976 076144  012777  000071  115002          MOV     #71,@ML.REG                     ;                                  9714
 21977 076152  105777  115046          14$:    TSTB    @ML.REG+50
 21978 076156  100375                          BPL     14$
 21979 076160  132777  000100  115046          BITB    #100,@ML.REG+60                 ;                                  9717
 21980 076166  001403                          BEQ     15$
 21981 076170  005777  115170                  TST     @ML.REG+210
 21982 076174  100434                          BMI     16$
 21983 076176  104455          15$:    TRAP    55                              ;                                          9720
 21984 076200  000210                          .WORD   210
 21985 076202  010526                          .WORD   SYNC
 21986 076204  024060                          .WORD   DUMPER
 21987 076206  012746  006374                  MOV     #WRD.9,-(SP)                    ;                                  9721
 21988 076212  012746  007340                  MOV     #WRD.76,-(SP)
 21989 076216  012746  006406                  MOV     #WRD.10,-(SP)
 21990 076222  012746  007240                  MOV     #WRD.67,-(SP)
 21991 076226  012746  006046                  MOV     #FOR.FMT,-(SP)
 21992 076232  012746  000005                  MOV     #5,-(SP)
 21993 076236  010600                          MOV     SP,R0                           ; SP,*
 21994 076240  104414                          TRAP    14
 21995 076242  010416                          MOV     R4,(SP)                         ; CHANNEL,*                        9722
 21996 076244  010346                          MOV     R3,-(SP)                        ; PLOG,*
 21997 076246  012746  005534                  MOV     #FMT.21,-(SP)
 21998 076252  012746  000003                  MOV     #3,-(SP)
 21999 076256  010600                          MOV     SP,R0                           ; SP,*
 22000 076260  104414                          TRAP    14
 22001 076262  062706  000022                  ADD     #22,SP                          ;                                  9719
 22002 076266  005001          16$:    CLR     R1                              ; CNT                                      9725
 22003 076270  010102          17$:    MOV     R1,R2                           ; CNT,*                                    9727
 22004 076272  006302                          ASL     R2
 22005 076274  005762  011600                  TST     IO.BUF(R2)
 22006 076300  001436                          BEQ     18$
 22007 076302  104455                          TRAP    55                              ;                                  9730
 22008 076304  000211                          .WORD   211
 22009 076306  010526                          .WORD   SYNC
 22010 076310  024060                          .WORD   DUMPER
 22011 076312  012746  007240                  MOV     #WRD.67,-(SP)                   ;                                  9731
 22012 076316  012746  006426                  MOV     #WRD.12,-(SP)
 22013 076322  012746  007330                  MOV     #WRD.75,-(SP)
 22014 076326  012746  007316                  MOV     #WRD.74,-(SP)
 22015 076332  012746  007174                  MOV     #WRD.61,-(SP)
 22016 076336  012746  006062                  MOV     #FIV.FMT,-(SP)
 22017 076342  012746  000006                  MOV     #6,-(SP)
 22018                         ;ML4                                                    14-May-1981 13:48:54    TOPS
 22019                         ;                                                       14-May-1981 13:05:08    PA:<
 22020
 22021 076346  010600                          MOV     SP,R0                           ; SP,*
 22022 076350  104414                          TRAP    14
 22023 076352  010416                          MOV     R4,(SP)                         ; CHANNEL,*                        9732
 22024 076354  010346                          MOV     R3,-(SP)                        ; PLOG,*
 22025 076356  012746  005534                  MOV     #FMT.21,-(SP)
 22026 076362  012746  000003                  MOV     #3,-(SP)
 22027 076366  010600                          MOV     SP,R0                           ; SP,*
 22028 076370  104414                          TRAP    14
 22029 076372  062706  000024                  ADD     #24,SP                          ;                                  9729
 22030 076376  005201          18$:    INC     R1                              ; CNT                                      9725
 22031 076400  020127  000014                  CMP     R1,#14                          ; CNT,*
```

```
22032 076404 003731                    BLE     17$
22033 076406 022626                    CMP     (SP)+,(SP)+                     ;                       9704
22034 076410 104467                    TRAP    67                              ;                       9733
22035 076412 006000                    ROR     R0
22036 076414 103614                    BLO     12$
22037 076416 005204                    INC     R4                              ; CHANNEL               9703
22038 076420 020427 000076             CMP     R4,#76                          ; CHANNEL,*
22039 076424 003610                    BLE     12$
22040 076426 005205                    INC     R5                              ; PLOG.SEL              9675
22041 076430 020527 000006             CMP     R5,#6                           ; PLOG.SEL,*
22042 076434 003002                    BGT     19$
22043 076436 000167 177304             JMP     2$
22044 076442 000207             19$:   RTS     PC                              ;                       9631
22045
22046                                  ; Routine Size:  175 words
22047                                  ; Maximum stack depth per invocation:  18 words
22052
22053
22057
22058                                          .SBTTL  T52
22062 076444                           T52::
22063 076444 004767 177236             1$:     JSR     PC,$T52                 ;                       9738
22064 076450 104466                            TRAP    66
22065 076452 006000                            ROR     R0
22066 076454 103773                            BLO     1$
22067 076456 000207                            RTS     PC
22068
22069                                  ; Routine Size:  6 words
22070                                  ; Maximum stack depth per invocation:  0 words
22078
22079
22080 ;          9741   !<BLF/PAGE>
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22082 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
22083 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (103)
22084
22085 ;          9742  !
22086 ;          9743  BGNTST;
22087 ;          9744
22088 ;          9745  !++
22089 ;          9746  ! TEST NUMBER:  TST 53
22090 ;          9747  !
22091 ;          9748  ! TEST NAME:            MULTIPLE CHANNEL ERROR SYNDRONE DECODE TEST
22092 ;          9749  !
22093 ;          9750  ! TEST DESCRIPTION:
22094 ;          9751  !       TEST SYNDRONE DECODE TO DETECT BUT NOT
22095 ;          9752  !       CORRECT UNCORRECTABLE MULTIPLE CHANNEL
22096 ;          9753  !       ERRORS BY:
22097 ;          9754  !
22098 ;          9755  !       1.  VIA ECC DIAGNOSTIC MODE FORCE SYNDRONE
22099 ;          9756  !           BITS TO INDICATE MULTIPLE CHANNEL ERRORS
22100 ;          9757  !           BY ASSIGNING CRC_A EQUAL TO CRC_B
22101 ;          9758  !
22102 ;          9759  !       2.  DO A MASS BUS READ TRANSFER
22103 ;          9760  !
22104 ;          9761  !       3.  THEN EXAMIN THE IO_BUF FOR  NO BITS
22105 ;          9762  !           COMPLIMENTED AND ECH AND UNC BITS SET
22106 ;          9763  !
22107 ;          9764  ! IMPLICIT INPUTS:
22108 ;          9765  !       IO_BUF
22109 ;          9766  !       A  VECTOR OF 256 WORDS WHERE DATA
22110 ;          9767  !       FOR MBUS READS AND WRITES TRANSFERS
22111 ;          9768  !       IS FOUND.
22112 ;          9769  !
22113 ;          9770  !
22114 ;          9771  !--
22115 ;          9772
22116 ;          9773  local
22117 ;          9774      PLOG;                                 !INDEX INTO REMAINDER TABLE 'REM_TBL'
22118 ;          9775
22119 ;          9776  BAI = ONE;                                !FIRST LETS CLEAR THE ML11'S GOOD
22120 ;          9777  IO_BUF = ZEROES;                          !BLOCK BY WRITING ZEROES TO IT
22121 ;          9778  GO_BLK_XFER ();
22122 ;          9779  MLCS1 = write;
22123 ;          9780  TIME_OUT_LOOP;
22124 ;          9781
22125 ;          9782  incr PLOG_SEL from 0 to 6 do              !TEST SYNDRONE DECODE AT 7 DIFFERENT PLOG VALUES
22126 ;          9783      begin
22127 ;          9784
22128 ;          9785      case .PLOG_SEL from 0 to 6 of         !SELECT A PLOG VALUE
22129 ;          9786          set
22130 ;          9787
22131 ;          9788          [0] :                             !POINTS TO CRC WORD 0
22132 ;          9789              PLOG = 0;
22133 ;          9790
22134 ;          9791          [1] :                             !POINTS TO CRC WORD 1
22135 ;          9792              PLOG = 1;
22136 ;          9793
22137 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
22138 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (103)
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22139
22140 ;          9794          [2] :                                   !POINTS TO CRC WORD 2
22141 ;          9795              PLOG = 2;
22142 ;          9796
22143 ;          9797          [3] :                                   !POINTS TO CRC WORD 3
22144 ;          9798              PLOG = 3;
22145 ;          9799
22146 ;          9800          [4] :                                   !POINTS TO CRC WORD 4
22147 ;          9801              PLOG = 4;
22148 ;          9802
22149 ;          9803          [5] :                                   !POINTS TO CRC WORD 5
22150 ;          9804              PLOG = 5;
22151 ;          9805
22152 ;          9806          [6] :                                   !POINTS TO ALL 6 WORDS IN CRC GROUP
22153 ;          9807              PLOG = 58;
22154 ;          9808          tes;
22155 ;          9809
22156 ;          9810      incr CHANNEL from 1 to 35 do                !TEST 35 CHANNELS STARTING AT CHANNEL 1
22157 ;          9811          begin
22158 ;          9812          BGNSUB;                                 !START OF SCOPE LOOP
22159 ;          9813          CLR_MBUS;                               !CLEAR THE DRIVE
22160 ;          9814
22161 ;          9815          incr COUNT from 0 to 255 do             !CLEAR FIRST CRC GROUP IN THE IO_BUF
22162 ;          9816              IO_BUF [.COUNT] = ZEROES;
22163 ;          9817
22164 ;          9818          FORCE_REM (.PLOG, .CHANNEL);            !FORCE ERR AT THIS WORD AND CHANNEL
22165 ;          9819          CRC_A = .CRC_B;                         !CRC_A EQL TO CRC_B CAUSES THE UNC ERROR
22166 ;          9820          GD_BLK_XFER ();                         !SET UP A GOOD BLOCK TRANSFER
22167 ;          9821          ECC_DIS = ZERO;                         !CLEAR ECC DISABLE
22168 ;          9822          MLCS1 = read;                           !DO A READ TRANSFER
22169 ;          9823          TIME_OUT_LOOP;                          !WAIR UNTIL THE TRANSFER IS COMPLETE
22170 ;          9824
22171 ;          9825          if not ((.ECH_ERR) and (.UNC_ERR))      !SEE IF THE ERROR WAS DETECTED
22172 ;          9826          then
22173 ;          9827              begin                               !REPORT ERROR IF NOT DETECTED
22174 ;          9828              ERRDF (138, SYNC, DUMPER);
22175 ;          9829              PRINTB (FOR_FMT, WRD_77, WRD_10, WRD_76, WRD_9);
22176 ;          9830              PRINTB (FMT_21, .PLOG, .CHANNEL);
22177 ;          9831              end;
22178 ;          9832
22179 ;          9833          incr CNT from 0 to 12 do                !SEE IF ANY ERROR CORRECTION WAS DONE
22180 ;          9834
22181 ;          9835              if .IO_BUF [.CNT] neq ZEROES        !TEST THE IO_BUF FOR ALL ZEROES
22182 ;          9836              then
22183 ;          9837                  begin                           !ERROR IF ANY BITS GOT FLIPPED
22184 ;          9838                  ERRDF (139, SYNC, DUMPER);
22185 ;          9839                  PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
22186 ;          9840                  PRINTB (FMT_21, .PLOG, .CHANNEL);
22187 ;          9841                  end;
22188 ;          9842
22189 ;          9843          ENDSUB;                                 !END OF SCOPE LOOP
22190 ;          9844          end;
22191 ;          9845
22192 ;ML4                                                            14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
22193 ;                                                               14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (103)
22194
22195 ;          9846      end;
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```
22259 076714 142777 000077 114402        BICB    #77,@ML.REG+150
22260 076722 150277 114376               BISB    R2,@ML.REG+150
22261 076726 004767 117136               JSR     PC,GD.BLK.XFER          ;                       9820
22262 076732 142777 000002 114334        BICB    #2,@ML.REG+120          ;                       9821
22263 076740 012777 000071 114206        MOV     #71,@ML.REG             ;                       9822
22264 076746 105777 114252         14$:  TSTB    @ML.REG+50
22265 076752 100375                      BPL     14$
22266 076754 132777 000100 114252        BITB    #100,@ML.REG+60         ;                       9825
22267 076762 001403                      BEQ     15$
22268 076764 005777 114374               TST     @ML.REG+210
22269 076770 100434                      BMI     16$
22270 076772 104455         15$:         TRAP    55                      ;                       9828
22271 076774 000212                      .WORD   212
22272 076776 010526                      .WORD   SYNC
22273 077000 024060                      .WORD   DUMPER
22274 077002 012746 006374               MOV     #WRD.9,-(SP)            ;                       9829
22275 077006 012746 007340               MOV     #WRD.76,-(SP)
22276 077012 012746 006406               MOV     #WRD.10,-(SP)
22277 077016 012746 007346               MOV     #WRD.77,-(SP)
22278 077022 012746 006046               MOV     #FOR.FMT,-(SP)
22279 077026 012746 000005               MOV     #5,-(SP)
22280 077032 010600                      MOV     SP,R0                   ; SP,*
22281 077034 104414                      TRAP    14
22282 077036 010416                      MOV     R4,(SP)                 ; CHANNEL,*             9830
22283 077040 010346                      MOV     R3,-(SP)                ; PLOG,*
22284 077042 012746 005534               MOV     #FMT.21,-(SP)
22285 077046 012746 000003               MOV     #3,-(SP)
22286 077052 010600                      MOV     SP,R0                   ; SP,*
22287 077054 104414                      TRAP    14
22288 077056 062706 000022               ADD     #22,SP                  ;                       9827
22289 077062 005001         16$:         CLR     R1                      ; CNT                   9833
22290 077064 010102         17$:         MOV     R1,R2                   ; CNT,*                 9835
22291 077066 006302                      ASL     R2
22292 077070 005762 011600               TST     IO.BUF(R2)
22293 077074 001436                      BEQ     18$
22294 077076 104455                      TRAP    55                      ;                       9838
22295 077100 000213                      .WORD   213
22296 077102 010526                      .WORD   SYNC
22297 077104 024060                      .WORD   DUMPER
22298 077106 012746 007240               MOV     #WRD.67,-(SP)           ;                       9839
22299 077112 012746 006426               MOV     #WRD.12,-(SP)
22300 077116 012746 007330               MOV     #WRD.75,-(SP)
22301 077122 012746 007316               MOV     #WRD.74,-(SP)
22302                       ;ML4                                                    14-May-1981 13:48:54    TOPS
22303                       ;                                                       14-May-1981 13:05:08    PA:<
22304
22305 077126 012746 007174               MOV     #WRD.61,-(SP)
22306 077132 012746 006062               MOV     #FIV.FMT,-(SP)
22307 077136 012746 000006               MOV     #6,-(SP)
22308 077142 010600                      MOV     SP,R0                   ; SP,*
22309 077144 104414                      TRAP    14
22310 077146 010416                      MOV     R4,(SP)                 ; CHANNEL,*             9840
22311 077150 010346                      MOV     R3,-(SP)                ; PLOG,*
22312 077152 012746 005534               MOV     #FMT.21,-(SP)
22313 077156 012746 000003               MOV     #3,-(SP)
22314 077162 010600                      MOV     SP,R0                   ; SP,*
22315 077164 104414                      TRAP    14
```

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22316 077166  062706  000024            ADD     #24,SP                          ;                                       9837
22317 077172  005201                18$:  INC     R1                              ; CNT                                   9833
22318 077174  020127  000014            CMP     R1,#14                          ; CNT,*
22319 077200  003731                    BLE     17$
22320 077202  022626                    CMP     (SP)+,(SP)+                     ;                                       9811
22321 077204  104467                    TRAP    67                              ;                                       9841
22322 077206  006000                    ROR     R0
22323 077210  103603                    BLO     12$
22324 077212  005204                    INC     R4                              ; CHANNEL                               9810
22325 077214  020427  000043            CMP     R4,#43                          ; CHANNEL,*
22326 077220  003002                    BGT     19$
22327 077222  000167  177372            JMP     12$
22328 077226  005205                19$:  INC     R5                              ; PLOG.SEL                              9782
22329 077230  020527  000006            CMP     R5,#6                           ; PLOG.SEL,*
22330 077234  003002                    BGT     20$
22331 077236  000167  177256            JMP     2$
22332 077242  000207                20$:  RTS     PC                              ;                                       9740
22333
22334                                   ; Routine Size:  186 words
22335                                   ; Maximum stack depth per invocation:  18 words
22340
22341
22345
22346                                           .SBTTL  T53
22350 077244                            T53::
22351 077244  004767  177210            1$:   JSR     PC,$T53                         ;                                       9846
22352 077250  104466                    TRAP    66
22353 077252  006000                    ROR     R0
22354 077254  103773                    BLO     1$
22355 077256  000207                    RTS     PC
22356
22357                                   ;ML4                                    14-May-1981 13:48:54    TOPS
22358                                   ;                                       14-May-1981 13:05:08    PA:<
22359
22360                                   ; Routine Size:  6 words
22361                                   ; Maximum stack depth per invocation:  0 words
22366
22367
22368 ;           9849  !<BLF/PAGE>
```

```
22370 ;ML4
22371 ;
22372
22373 ;          9850  !
22374 ;          9851  BGNTST;
22375 ;          9852
22376 ;          9853  !++
22377 ;          9854  ! TEST NUMBER:  TST 54
22378 ;          9855  !
22379 ;          9856  ! TEST NAME:            SINGLE BIT ERROR SYNDRONE GENERATION & DECODE TEST
22380 ;          9857  !
22381 ;          9858  ! TEST DESCRIPTION:
22382 ;          9859  !       TEST SYNDRONE GENERATION, SYNDRONE DECODE
22383 ;          9860  !       AND ERROR CORRECTION FOR SINGLE BIT CHANNEL
22384 ;          9861  !       ERRORS BY:
22385 ;          9862  !
22386 ;          9863  !       1.  CLEAR THE FIRST CRC GROUP IN THE
22387 ;          9864  !           IO_BUF AND GOOD BLOCK TO ZEROES
22388 ;          9865  !
22389 ;          9866  !       2.  VIA DATA DIAGNOSTIC MODE FLIP A BIT
22390 ;          9867  !           TO A ONE
22391 ;          9868  !
22392 ;          9869  !       3.  THEN DO A MASS BUS READ TRANSFER AND
22393 ;          9870  !           EXAMIN THE IO BUF FOR ZEROES INDICATING
22394 ;          9871  !           THE CORRECTION WAS PERFORMED
22395 ;          9872  !
22396 ;          9873  !       4.  REPEAT WITH ALL BITS IN THE CRC GROUP
22397 ;          9874  !
22398 ;          9875  ! IMPLICIT INPUTS:
22399 ;          9876  !       IO_BUF
22400 ;          9877  !       A  VECTOR OF 256 WORDS WHERE DATA
22401 ;          9878  !       FOR MBUS READS AND WRITES TRANSFERS
22402 ;          9879  !       IS FOUND.
22403 ;          9880  !
22404 ;          9881  !       PD_TEMP
22405 ;          9882  !       A BIT VECTOR OF 16 BITS WHERE THE READ
22406 ;          9883  !       PROM DATA IS STORED AND ACCESSED FROM.
22407 ;          9884  !
22408 ;          9885  !
22409 ;          9886  !--
22410 ;          9887
22411 ;          9888  local
22412 ;          9889      DONE,                                  !DONE FLAG
22413 ;          9890      NIB_PAT : bitvector [4],               !STORAGE FOR SBE DATA GENERATED
22414 ;          9891      NIB_SEL,                               !POINTER WHERE SBE IS TO BE WRITTEN
22415 ;          9892      GD_WRD_CNT;                            !COUNT OF WHERE GOOD 'NIB_SEL' ARE FOUND
22416 ;          9893
22417 ;          9894  incr WRD_CNT from 0 to 5 do                !FORCE SINGLE BIT ERRORS IN ONE CRC GROUP
22418 ;          9895      begin
22419 ;          9896
22420 ;          9897      incr BIT_CNT from 0 to 35 do           !FORCE SBE'S AT EACH BIT OF A WORD
22421 ;          9898          begin
22422 ;          9899
22423 ;          9900          incr CNT from 0 to 255 do          !CLEAR FIRST CRC GROUP OF IO_BUF
22424 ;          9901              IO_BUF [.CNT] = ZEROES;
22425 ;ML4
22426 ;
```

```
22427
22428 ;          9902
22429 ;          9903          CLR_MBUS;                              !CLEAR THE DRIVE
22430 ;          9904          GD_BLK_XFER ();                        !SET UP A GOOF BLOCK TRANSFER
22431 ;          9905          MLCS1 = write;                         !DO A WRITE TRANSFER
22432 ;          9906          TIME_OUT_LOOP;                         !WAIT UNTIL THE TRANSFER IS COMPLETE
22433 ;          9907          CLR_MBUS;                              !CLEAR THE DRIVE AGAIN
22434 ;          9908          DONE = ZERO;                           !CLEAR THE DONE FLAG
22435 ;          9909          GD_WRD_CNT = -1;                       !RESET THE COUNT
22436 ;          9910          MLD1 = ZEROES;                         !LOAD THE DATA DIAG REG (BITS 0-38)
22437 ;          9911          MLD2 = ZEROES;                         !WITH ZEROES PAT AND CRC BIT FOR
22438 ;          9912          MLE2 = %o'060000';                     !ZEROES PAT
22439 ;          9913          NIB_SEL = .BIT_CNT/4;                  !CALCULATE THE NIBBLE WHERE THE SBE IS TO GO
22440 ;          9914          DAT_DM_XFER ();                        !SET UP A DATA DIAG MODE TRANSFER
22441 ;          9915          MLCS1 = write;                         !DO A WRITE TRANSFER
22442 ;          9916          DELAY (ONE_US);                        !GIVE THE PROM DATA TIME TO GET OUT
22443 ;          9917
22444 ;          9918          do                                     !FIND THE GOOD NIB AT THE TESTED WORD
22445 ;          9919              begin
22446 ;          9920              PD_TEMP = .MLPD;                   !READ THE PROM DATA FOR THIS ARRAY WORD
22447 ;          9921
22448 ;          9922              if .PD_TEMP [.NIB_SEL] IS_SET      !IS THIS A GOOD NIBBLE
22449 ;          9923              then
22450 ;          9924                  DAT_CLK = ONE                  !IF NOT THEN GET THE NEXT ARRAY WORD
22451 ;          9925              else
22452 ;          9926                  begin                          !ELSE SEE IF WE ARE AT THE TESTED WORD
22453 ;          9927                  GD_WRD_CNT = .GD_WRD_CNT + 1;  !UP THE COUNT
22454 ;          9928                                                 !AND SEE IF WE ARE DONE
22455 ;          9929
22456 ;          9930                  if .GD_WRD_CNT eql .WRD_CNT then DONE = ONE else DAT_CLK = ONE;
22457 ;          9931
22458 ;          9932                  end;
22459 ;          9933
22460 ;          9934              end
22461 ;          9935          until .DONE IS_SET;                    !REPEAT UNTIL WE ARE DONE
22462 ;          9936
22463 ;          9937          NIB_PAT = ZEROES;                      !CLEAR THE SAVE LOCATION
22464 ;          9938          NIB_PAT [.BIT_CNT mod 4] = ONE;        !AND SET THE SBE IN THIS NIBBLE
22465 ;          9939          D1_TEMP = ZEROES;                      !CLEAR THE OTHER NIBBLES IN THIS ARRAY WORD
22466 ;          9940          D2_TEMP = ZEROES;                      !TO BE ZEROES PATTERN AND ZEROES CRC PATTERN
22467 ;          9941          E2_TEMP = %o'060000';
22468 ;          9942          LD_LNG_WRD (.NIB_SEL, .NIB_PAT);       !LOAD THE SBE INTO THE SAVE LOCATION
22469 ;          9943          WRT_LNG_WRD;                           !AND WRITE THE SBE INTO THE DATA DIAG RES'S
22470 ;          9944          DAT_CLK = ONE;                         !CLOCK THE SBE INTO THE ARRAYS MEMORY
22471 ;          9945          DELAY (ONE_US);                        !GIVE IT TIME TO WRITE INTO THE MEMORY
22472 ;          9946          BGNSUB;                                !START OF SCOPE LOOP
22473 ;          9947          CLR_MBUS;                              !CLEAR OUT THE DATA DIAG MODE XFERR
22474 ;          9948          GD_BLK_XFER ();                        !SET UP A GOOD BLOCK TRANSFER
22475 ;          9949          ECC_DIS = ZERO;                        !CLEAR ECC DISABLE
22476 ;          9950          MLCS1 = read;                          !AND READ OUT THE SBE
22477 ;          9951          TIME_OUT_LOOP;
22478 ;          9952
22479 ;          9953          incr CNT from 0 to 13 do               !SEE IF THE SBE WAS CORRECTED
22480 ;ML4                                                           14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
22481 ;                                                             14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (104)
22482
22483 ;          9954
```

```
 22484 ;          9955              if .IO_BUF [.CNT] neq ZEROES        !TEST THE IO_BUF FOR ALL ZEROES
 22485 ;          9956              then
 22486 ;          9957                  begin                           !ERROR IF THE ERROR WAS NOT CORRECTED
 22487 ;          9958                  ERRDF (140, SYNC, DUMPER);
 22488 ;          9959                  PRINTB (THR_FMT, PHR_12, WRD_76, WRD_9);
 22489 ;          9960                  PRINTB (FMT_22, .WRD_CNT, .BIT_CNT);
 22490 ;          9961                  end;
 22491 ;          9962
 22492 ;          9963              ENDSUB;                             !END OF SCOPE LOOP
 22493 ;          9964              end;
 22494 ;          9965
 22495 ;          9966          end;
 22496 ;          9967
 22497 ;          9968      ENDTST;
 22501
 22502                                          .SBTTL  $T54
 22506 077260  004167  104632          $T54:   JSR     R1,$SAVE5                       ;                                   9848
 22507 077264  162706  000010                  SUB     #10,SP
 22508 077270  005001                          CLR     R1                              ; WRD.CNT                           9894
 22509 077272  005002                  1$:     CLR     R2                              ; BIT.CNT                           9897
 22510 077274  005003                  2$:     CLR     R3                              ; CNT                               9900
 22511 077276  010304                  3$:     MOV     R3,R4                           ; CNT,*                             9901
 22512 077300  006304                          ASL     R4
 22513 077302  005064  011600                  CLR     IO.BUF(R4)
 22514 077306  005203                          INC     R3                              ; CNT                               9900
 22515 077310  020327  000377                  CMP     R3,#377                         ; CNT,*
 22516 077314  003770                          BLE     3$
 22517 077316  152777  000040  113670          BISB    #40,@ML.REG+40                  ;                                   9901
 22518 077324  016704  114252                  MOV     ML.DUT,R4
 22519 077330  042704  177770                  BIC     #177770,R4
 22520 077334  142777  000007  113652          BICB    #7,@ML.REG+40
 22521 077342  150477  113646                  BISB    R4,@ML.REG+40
 22522 077346  004767  116516                  JSR     PC,GD.BLK.XFER                  ;                                   9904
 22523 077352  012777  000061  113574          MOV     #61,@ML.REG                     ;                                   9905
 22524 077360  105777  113640          4$:     TSTB    @ML.REG+50
 22525 077364  100375                          BPL     4$
 22526 077366  152777  000040  113620          BISB    #40,@ML.REG+40                  ;                                   9906
 22527 077374  016704  114202                  MOV     ML.DUT,R4
 22528 077400  042704  177770                  BIC     #177770,R4
 22529 077404  142777  000007  113602          BICB    #7,@ML.REG+40
 22530 077412  150477  113576                  BISB    R4,@ML.REG+40
 22531 077416  005066  000002                  CLR     2(SP)                           ; DONE                              9908
 22532 077422  012716  177777                  MOV     #-1,(SP)                        ; *,GD.WRD.CNT                      9909
 22533 077426  005077  113712                  CLR     @ML.REG+170                     ;                                   9910
 22534 077432  005077  113716                  CLR     @ML.REG+200                     ;                                   9911
 22535                                  ;ML4                                                    14-May-1981 13:48:54    TOPS
 22536                                  ;                                                       14-May-1981 13:05:08    PA:<
 22537
 22538 077436  012777  060000  113670          MOV     #60000,@ML.REG+160              ;                                   9912
 22539 077444  010246                          MOV     R2,-(SP)                        ; BIT.CNT,*                         9913
 22540 077446  012746  000004                  MOV     #4,-(SP)
 22541 077452  004767  104274                  JSR     PC,BL$DIV
 22542 077456  010005                          MOV     R0,R5                           ; *,NIB.SEL
 22543 077460  004767  114476                  JSR     PC,DAT.DM.XFER                  ;                                   9914
 22544 077464  012777  000061  113462          MOV     #61,@ML.REG                     ;                                   9915
 22545 077472  012703  000001                  MOV     #1,R3                           ; *,$$TMP2                          9916
 22546 077476  001411                  5$:     BEQ     8$
```

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22547 077500  016704  102412              MOV     L$DLY,R4                ; *,$$TMP1
22548 077504  001404                      BEQ     7$
22549 077506  005066  000012        6$:   CLR     12(SP)                  ; $$TMP
22550 077512  005304                      DEC     R4                      ; $$TMP1
22551 077514  001374                      BNE     6$
22552 077516  005303              7$:     DEC     R3                      ; $$TMP2
22553 077520  000766                      BR      5$
22554 077522  010504              8$:     MOV     R5,R4                   ; NIB.SEL,*                          9922
22555 077524  006204                      ASR     R4
22556 077526  006204                      ASR     R4
22557 077530  006204                      ASR     R4
22558 077532  062704  013120              ADD     #PD.TEMP,R4
22559 077536  017767  113642  113354  9$: MOV     @ML.REG+230,PD.TEMP     ;                                    9920
22560 077544  010446                      MOV     R4,-(SP)                ;                                    9922
22561 077546  010546                      MOV     R5,-(SP)                ; NIB.SEL,*
22562 077550  042716  177770              BIC     #177770,(SP)
22563 077554  012746  000001              MOV     #1,-(SP)
22564 077560  005046                      CLR     -(SP)
22565 077562  004767  103352              JSR     PC,BL$GT2
22566 077566  062706  000010              ADD     #10,SP
22567 077572  005300                      DEC     R0
22568 077574  001411                      BEQ     10$                     ;                                    9924
22569 077576  005266  000004              INC     4(SP)                   ; GD.WRD.CNT                         9927
22570 077602  026601  000004              CMP     4(SP),R1                ; GD.WRD.CNT,WRD.CNT                 9930
22571 077606  001004                      BNE     10$
22572 077610  012766  000001  000006      MOV     #1,6(SP)                ; *,DONE
22573 077616  000403                      BR      11$
22574 077620  152777  000020  113446 10$: BISB    #20,@ML.REG+120
22575 077626  026627  000006  000001 11$: CMP     6(SP),#1                ; DONE,*                             9935
22576 077634  001340                      BNE     9$
22577 077636  005066  000010              CLR     10(SP)                  ; NIB.PAT                            9937
22578 077642  010246                      MOV     R2,-(SP)                ; BIT.CNT,*                          9938
22579 077644  012746  000004              MOV     #4,-(SP)
22580 077650  004767  104110              JSR     PC,BL$MOD
22581 077654  010004                      MOV     R0,R4
22582 077656  006200                      ASR     R0
22583 077660  006200                      ASR     R0
22584 077662  006200                      ASR     R0
22585 077664  012703  000014              MOV     #14,R3
22586 077670  060603                      ADD     SP,R3                   ; NIB.PAT,*
22587 077672  060300                      ADD     R3,R0
22588 077674  010016                      MOV     R0,(SP)
22589 077676  010446                      MOV     R4,-(SP)
22590                       ;ML4                                                    14-May-1981 13:48:54    TOPS
22591                       ;                                                       14-May-1981 13:05:08    PA:<
22592
22593 077700  042716  177770              BIC     #177770,(SP)
22594 077704  012746  000001              MOV     #1,-(SP)
22595 077710  011646                      MOV     (SP),-(SP)
22596 077712  004767  103460              JSR     PC,BL$PU2
22597 077716  005067  111230              CLR     D1.TEMP                 ;                                    9939
22598 077722  005067  111226              CLR     D2.TEMP                 ;                                    9940
22599 077726  012767  060000  111222      MOV     #60000,E2.TEMP          ;                                    9941
22600 077734  010516                      MOV     R5,(SP)                 ; NIB.SEL,*                          9942
22601 077736  016646  000022              MOV     22(SP),-(SP)            ; NIB.PAT,*
22602 077742  004767  117164              JSR     PC,LD.LNG.WRD
22603 077746  016777  111200  113370      MOV     D1.TEMP,@ML.REG+170
```

```
22604 077754  016777  111174  113372          MOV     D2.TEMP,@ML.REG+200
22605 077762  016777  111170  113344          MOV     E2.TEMP,@ML.REG+160
22606 077770  152777  000020  113276          BISB    #20,@ML.REG+120         ;                                                       9944
22607 077776  012703  000001                  MOV     #1,R3                   ; *,$$TMP2                                              9945
22608 100002  001411                  12$:    BEQ     15$
22609 100004  016704  102106                  MOV     L$DLY,R4                ; *,$$TMP1
22610 100010  001404                          BEQ     14$
22611 100012  005066  000026          13$:    CLR     26(SP)                  ; $$TMP
22612 100016  005304                          DEC     R4                      ; $$TMP1
22613 100020  001374                          BNE     13$
22614 100022  005303                  14$:    DEC     R3                      ; $$TMP2
22615 100024  000766                          BR      12$
22616 100026  104402                  15$:    TRAP    2
22617 100030  152777  000040  113156          BISB    #40,@ML.REG+40          ;                                                       9946
22618 100036  016704  113540                  MOV     ML.DUT,R4
22619 100042  042704  177770                  BIC     #177770,R4
22620 100046  142777  000007  113140          BICB    #7,@ML.REG+40
22621 100054  150477  113134                  BISB    R4,@ML.REG+40
22622 100060  004767  116004                  JSR     PC,GD.BLK.XFER          ;                                                       9948
22623 100064  142777  000002  113202          BICB    #2,@ML.REG+120          ;                                                       9949
22624 100072  012777  000071  113054          MOV     #71,@ML.REG             ;                                                       9950
22625 100100  105777  113120          16$:    TSTB    @ML.REG+50
22626 100104  100375                          BPL     16$
22627 100106  005003                          CLR     R3                      ; CNT                                                   9953
22628 100110  010304                  17$:    MOV     R3,R4                   ; CNT,*                                                 9955
22629 100112  006304                          ASL     R4
22630 100114  005764  011600                  TST     IO.BUF(R4)
22631 100120  001432                          BEQ     18$
22632 100122  104455                          TRAP    55                      ;                                                       9958
22633 100124  000214                          .WORD   214
22634 100126  010526                          .WORD   SYNC
22635 100130  024060                          .WORD   DUMPER
22636 100132  012746  006374                  MOV     #WRD.9,-(SP)            ;                                                       9959
22637 100136  012746  007340                  MOV     #WRD.76,-(SP)
22638 100142  012746  007614                  MOV     #PHR.12,-(SP)
22639 100146  012746  006034                  MOV     #THR.FMT,-(SP)
22640 100152  012746  000004                  MOV     #4,-(SP)
22641 100156  010600                          MOV     SP,R0                   ; SP,*
22642 100160  104414                          TRAP    14
22643 100162  010216                          MOV     R2,(SP)                 ; BIT.CNT,*                                             9960
22644 100164  010146                          MOV     R1,-(SP)                ; WRD.CNT,*
22645                         ;ML4                                                    14-May-1981 13:48:54    TOPS
22646                         ;                                                       14-May-1981 13:05:08    PA:<
22647
22648 100166  012746  005606                  MOV     #FMT.22,-(SP)
22649 100172  012746  000003                  MOV     #3,-(SP)
22650 100176  010600                          MOV     SP,R0                   ; SP,*
22651 100200  104414                          TRAP    14
22652 100202  062706  000020                  ADD     #20,SP                  ;                                                       9957
22653 100206  005203                  18$:    INC     R3                      ; CNT                                                   9953
22654 100210  020327  000015                  CMP     R3,#15                  ; CNT,*
22655 100214  003735                          BLE     17$
22656 100216  104467                          TRAP    67                      ;                                                       9961
22657 100220  006000                          ROR     R0
22658 100222  103701                          BLO     15$
22659 100224  062706  000020                  ADD     #20,SP                  ;                                                       9898
22660 100230  005202                          INC     R2                      ; BIT.CNT                                               9897
```

```
22661 100232  020227  000043            CMP     R2,#43                          ; BIT.CNT,*
22662 100236  003002                    BGT     19$
22663 100240  000167  177030            JMP     2$
22664 100244  005201            19$:    INC     R1                              ; WRD.CNT                       9894
22665 100246  020127  000005            CMP     R1,#5                           ; WRD.CNT,*
22666 100252  003002                    BGT     20$
22667 100254  000167  177012            JMP     1$
22668 100260  062706  000010    20$:    ADD     #10,SP                          ;                               9848
22669 100264  000207                    RTS     PC
22670
22671                           ; Routine Size:  259 words
22672                           ; Maximum stack depth per invocation:  26 words
22677
22678
22682
22683                                   .SBTTL  T54
22687 100266                    T54::
22688 100266  004767  176766    1$:     JSR     PC,$T54                         ;                               9966
22689 100272  104466                    TRAP    66
22690 100274  006000                    ROR     R0
22691 100276  103773                    BLO     1$
22692 100300  000207                    RTS     PC
22693
22694                           ; Routine Size:  6 words
22695                           ; Maximum stack depth per invocation:  0 words
22700 ;ML4                                                14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
22701 ;                                                   14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (104)
22702
22703 ;         9969  !<BLF/PAGE>
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14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (105)

```
22705 ;ML4
22706 :
22707
22708 :          9970  !
22709 :          9971  BGNTST;
22710 :          9972
22711 :          9973  !++
22712 :          9974  ! TEST NUMBER:  TST 55
22713 :          9975  !
22714 :          9976  ! TEST NAME:            MULTIPLE BIT ERROR SYNDRONE GENERATION AND DECODE TEST
22715 :          9977  !
22716 :          9978  ! TEST DESCRIPTION:
22717 :          9979  !       TEST SYNDRONE GENERATION, SYNDRONE DECODE
22718 :          9980  !       AND ERROR CORRECTION FOR MULTIPLE BIT
22719 :          9981  !       CHANNEL ERRORS BY:
22720 :          9982  !
22721 :          9983  !       1.  CLEAR THE FIRST CRC GROUP IN THE
22722 :          9984  !           IO_BUF AND GOOD BLOCK TO ZEROES
22723 :          9985  !
22724 :          9986  !       2.  VIA DATA DIAG MODE FLIP ALL BITS IN
22725 :          9987  !           A CHANNEL TO ONES
22726 :          9988  !
22727 :          9989  !       3.  THEN DO A MASS BUS READ TRANSFER AND
22728 :          9990  !           EXAMIN THE IO_BUF FOR ZEROES INDICATING
22729 :          9991  !           THE CORRECTION WAS PERFORMED
22730 :          9992  !
22731 :          9993  !       4.  REPEAT FOR ALL CHANNELS IN THE CRC GROUP
22732 :          9994  !
22733 :          9995  ! IMPLICIT INPUTS:
22734 :          9996  !       PD_TEMP
22735 :          9997  !       A BIT VECTOR OF 16 BITS WHERE THE READ
22736 :          9998  !       PROM DATA IS STORED OAND ACCESSED FROM.
22737 :          9999  !
22738 :         10000  !       IO_BUF
22739 :         10001  !       A  VECTOR OF 256 WORDS WHERE DATA
22740 :         10002  !       FOR MBUS READS AND WRITES TRANSFERS
22741 :         10003  !       IS FOUND.
22742 :         10004  !
22743 :         10005  !
22744 :         10006  !--
22745 :         10007
22746 :         10008  local
22747 :         10009      NIB_PAT : bitvector [4],          !STORAGE FOR SBE TO BE GENERATED
22748 :         10010      NIB_SEL,                          !POINTER TO WHERE ERROR IS TO BE WRITTEN
22749 :         10011      GD_WRD_CNT;                       !COUNT OF WHERE GOOD 'NIB_SEL' ARE FOUND
22750 :         10012
22751 :         10013  E2_TEMP<12, 3> = %b'110';            !LOAD DATA STRUCTURE WITH ZEROES CRC PATTERN
22752 :         10014
22753 :         10015  incr BIT_CNT from 0 to 35 do         !TEST FOR MULTILPLE ERRORS AT 36 CHANNELS
22754 :         10016      begin
22755 :         10017      CLR_MBUS;                         !CLEAR THE DRIVE
22756 :         10018
22757 :         10019      incr CNT from 0 to 255 do         !CLEAR FIRST CRC GROUP IN THE IO_BUF
22758 :         10020          IO_BUF [.CNT] = ZEROES;
22759 :         10021
```

```
22761 ;ML4
22762 ;
22763
22764 ;          10022      GD_BLK_XFER ();                          !ALSO CLEAR THTE FIRST CRC GROUP
22765 ;          10023      MLCS1 = write;                           !IN THE ML11'S GOOD BLOCK
22766 ;          10024      TIME_OUT_LOOP;
22767 ;          10025      GD_WRD_CNT = ZERO;                       !CLEAR COUNT
22768 ;          10026      D1_TEMP = ZEROES;                        !CLEAR D1_TEMP
22769 ;          10027      D2_TEMP = ZEROES;                        !CLEAR D2_TEMP
22770 ;          10028      NIB_PAT = ZEROES;                        !CLEAR NIBBLE PATTERN
22771 ;          10029      NIB_SEL = .BIT_CNT/4;                    !CALCULATE THE NIBBLE TO BE IN ERROR
22772 ;          10030      NIB_PAT [.BIT_CNT mod 4] = ONE;          !CALCULATE AND THE BIT TO BE IN ERROR
22773 ;          10031      LD_LNG_WRD (.NIB_SEL, .NIB_PAT);         !LOAD THE ERROR IN D1_TEMP OR D2_TEMP
22774 ;          10032      WRT_LNG_WRD;                             !LOAD THE REGISTER WITH THE ERROR
22775 ;          10033      DAT_DM_XFER ();                          !SET UP A DATA DIAG MODE TRANSFER
22776 ;          10034      MLCS1 = write;                           !DO A WRITE TRANSFER
22777 ;          10035      DELAY (ONE_US);                          !GIVE THE PROM DATA TIME TO COME OUT
22778 ;          10036
22779 ;          10037      do                                       !LOAD THIS CHANNEL WITH MULTIPLE ERRORS
22780 ;          10038          begin
22781 ;          10039          PD_TEMP = .MLPD;                     !READ THIS ARRAY WORDS PROM_DATA
22782 ;          10040
22783 ;          10041          if .PD_TEMP [.NIB_SEL] IS_SET        !SEE IF THIS A GOOD NIBBLE
22784 ;          10042          then
22785 ;          10043              DAT_CLK = ONE                    !CLOCK OUT ANOTHER ARRAY WORD IF BAD
22786 ;          10044          else
22787 ;          10045              begin                            !ELSE CLOCK IN THE ERROR INTO A GOOD NIBBLE
22788 ;          10046              GD_WRD_CNT = .GD_WRD_CNT + 1;
22789 ;          10047              DAT_CLR = ONE;
22790 ;          10048              end;
22791 ;          10049
22792 ;          10050          end
22793 ;          10051      until .GD_WRD_CNT eql 6;                 !REPEAT UNTIL 6 WORDS ARE WRITTEN
22794 ;          10052
22795 ;          10053      BGNSUB;                                  !START OF SCOPE LOOP
22796 ;          10054      CLR_MBUS;                                !CLEAR OUT THE DATA DISG MODE TRANSFER
22797 ;          10055      GD_BLK_XFER ();                          !SET UP A GOOD BLOCK TRANSFER
22798 ;          10056      ECC_DIS = 0;                             !ENABLE ERROR CORRECTION
22799 ;          10057      MLCS1 = read;                            !READ OUT THE ERRORS
22800 ;          10058      TIME_OUT_LOOP;                           !WAIT FOR THE TRANSFER TO COMPLETE
22801 ;          10059
22802 ;          10060      incr WRD_CNT from 0 to 13 do             !SEE IF THE CORRECTIONS WHERE DONE
22803 ;          10061
22804 ;          10062          if .IO_BUF [.WRD_CNT] neq ZEROES     !TEST THE IO_BUF FOR ALL ZEROES
22805 ;          10063          then
22806 ;          10064              begin                            !REPORT THE ERROR IF ANY LOCATIONS ARE NOT ZEROES
22807 ;          10065              ERRDF (141, SYNC, DUMPER);
22808 ;          10066              PRINTB (THR_FMT, PHR_13, WRD_76, WRD_9);
22809 ;          10067              PRINTB (FMT_22, .WRD_CNT, .BIT_CNT);
22810 ;          10068              end;
22811 ;          10069
22812 ;          10070      ENDSUB;                                  !END OF SCOPE LOOP
22813 ;          10071      end;
22814 ;          10072
22815 ;          10073 ENDTST;
```

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14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (105)

```
22817 ;ML4
22818 ;
22819
22823
22824                                          .SBTTL  $T55
22828 100302  004167  103610           $T55:  JSR     R1,$SAVE5                    ;                                  9968
22829 100306  024646                         CMP     -(SP),-(SP)
22830 100310  042767  070000  110640         BIC     #70000,E2.TEMP               ;                                  1001
22831 100316  052767  060000  110632         BIS     #60000,E2.TEMP
22832 100324  005003                         CLR     R3                           ; BIT.CNT                          1001
22833 100326  152777  000040  112660   1$:   BISB    #40,@ML.REG+40               ;                                  1001
22834 100334  016702  113242                MOV     ML.DUT,R2
22835 100340  042702  177770                BIC     #177770,R2
22836 100344  142777  000007  112642         BICB    #7,@ML.REG+40
22837 100352  150277  112636                BISB    R2,@ML.REG+40
22838 100356  005001                         CLR     R1                           ; CNT                              1001
22839 100360  010102                   2$:   MOV     R1,R2                        ; CNT,*                            1002
22840 100362  006302                         ASL     R2
22841 100364  005062  011600                CLR     IO.BUF(R2)
22842 100370  005201                         INC     R1                           ; CNT                              1001
22843 100372  020127  000377                CMP     R1,#377                      ; CNT,*
22844 100376  003770                         BLE     2$
22845 100400  004767  115464                JSR     PC,GD.BLK.XFER               ;                                  1002
22846 100404  012777  000061  112542         MOV     #61,@ML.REG                  ;                                  1002
22847 100412  105777  112606           3$:   TSTB    @ML.REG+50
22848 100416  100375                         BPL     3$
22849 100420  005005                         CLR     R5                           ; GD.WRD.CNT                       1002
22850 100422  005067  110524                CLR     D1.TEMP                      ;                                  1002
22851 100426  005067  110522                CLR     D2.TEMP                      ;                                  1002
22852 100432  005016                         CLR     (SP)                         ; NIB.PAT                          1002
22853 100434  010346                         MOV     R3,-(SP)                     ; BIT.CNT,*                        1002
22854 100436  012746  000004                MOV     #4,-(SP)
22855 100442  004767  103304                JSR     PC,BL$DIV
22856 100446  010004                         MOV     R0,R4                        ; *,NIB.SEL
22857 100450  010346                         MOV     R3,-(SP)                     ; BIT.CNT,*                        1003
22858 100452  012746  000004                MOV     #4,-(SP)
22859 100456  004767  103302                JSR     PC,BL$MOD
22860 100462  010002                         MOV     R0,R2
22861 100464  006200                         ASR     R0
22862 100466  006200                         ASR     R0
22863 100470  006200                         ASR     R0
22864 100472  012701  000010                MOV     #10,R1
22865 100476  060601                         ADD     SP,R1                        ; NIB.PAT,*
22866 100500  060100                         ADD     R1,R0
22867 100502  010016                         MOV     R0,(SP)
22868 100504  010246                         MOV     R2,-(SP)
22869 100506  042716  177770                BIC     #177770,(SP)
22870 100512  012746  000001                MOV     #1,-(SP)
22871 100516  011646                         MOV     (SP),-(SP)
```

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                                                                                    14-May-1981 13:48:54    TOPS
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22873                           ;ML4
22874                           ;
22875
22876 100520 004767 102652              JSR     PC,BL$PU2
22877 100524 010416                     MOV     R4,(SP)                 ; NIB.SEL,*                     1003
22878 100526 016646 000016              MOV     16(SP),-(SP)            ; NIB.PAT,*
22879 100532 004767 116374              JSR     PC,LD.LNG.WRD
22880 100536 016777 110410 112600       MOV     D1.TEMP,@ML.REG+170
22881 100544 016777 110404 112602       MOV     D2.TEMP,@ML.REG+200
22882 100552 016777 110400 112554       MOV     E2.TEMP,@ML.REG+160
22883 100560 004767 113376              JSR     PC,DAT.DM.XFER          ;                               1003
22884 100564 012777 000061 112362       MOV     #61,@ML.REG             ;                               1003
22885 100572 012701 000001              MOV     #1,R1                   ; *,$$TMP2                      1003
22886 100576 001411             4$:     BEQ     7$
22887 100600 016702 101312              MOV     L$DLY,R2                ; *,$$TMP1
22888 100604 001404                     BEQ     6$
22889 100606 005066 000022      5$:     CLR     22(SP)                  ; $$TMP
22890 100612 005302                     DEC     R2                      ; $$TMP1
22891 100614 001374                     BNE     5$
22892 100616 005301             6$:     DEC     R1                      ; $$TMP2
22893 100620 000766                     BR      4$
22894 100622 010402             7$:     MOV     R4,R2                   ; NIB.SEL,*                     1004
22895 100624 006202                     ASR     R2
22896 100626 006202                     ASR     R2
22897 100630 006202                     ASR     R2
22898 100632 062702 013120              ADD     #PD.TEMP,R2
22899 100636 017767 112542 112254 8$:   MOV     @ML.REG+230,PD.TEMP     ;                               1003
22900 100644 010246                     MOV     R2,-(SP)                ;                               1004
22901 100646 010446                     MOV     R4,-(SP)                ; NIB.SEL,*
22902 100650 042716 177770              BIC     #177770,(SP)
22903 100654 012746 000001              MOV     #1,-(SP)
22904 100660 005046                     CLR     -(SP)
22905 100662 004767 102252              JSR     PC,BL$GT2
22906 100666 062706 000010              ADD     #10,SP
22907 100672 005300                     DEC     R0
22908 100674 001401                     BEQ     9$                      ;                               1004
22909 100676 005205                     INC     R5                      ; GD.WRD.CNT                    1004
22910 100700 152777 000020 112366 9$:   BISB    #20,@ML.REG+120         ;                               1004
22911 100706 020527 000006              CMP     R5,#6                   ; GD.WRD.CNT,*                  1005
22912 100712 001351                     BNE     8$
22913 100714 104402             10$:    TRAP    2
22914 100716 152777 000040 112270       BISB    #40,@ML.REG+40          ;                               1005
22915 100724 016702 112652              MOV     ML.DUT,R2
22916 100730 042702 177770              BIC     #177770,R2
22917 100734 142777 000007 112252       BICB    #7,@ML.REG+40
22918 100742 150277 112246              BISB    R2,@ML.REG+40
22919 100746 004767 115116              JSR     PC,GD.BLK.XFER          ;                               1005
22920 100752 142777 000002 112314       BICB    #2,@ML.REG+120          ;                               1005
22921 100760 012777 000071 112166       MOV     #71,@ML.REG             ;                               1005
22922 100766 105777 112232      11$:    TSTB    @ML.REG+50
22923 100772 100375                     BPL     11$
22924 100774 005001                     CLR     R1                      ; WRD.CNT                       1006
22925 100776 010102             12$:    MOV     R1,R2                   ; WRD.CNT,*                     1006
22926 101000 006302                     ASL     R2
22927 101002 005762 011600              TST     IO.BUF(R2)
```

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                                                                                                    14-May-1981 13:48:54    TOPS
                                                                                                    14-May-1981 13:05:08    PA:<
22929                           ;ML4
22930                           ;
22931
22932 101006  001432                    BEQ     13$
22933 101010  104455                    TRAP    55                                      ;                                       1006
22934 101012  000215                    .WORD   215
22935 101014  010526                    .WORD   SYNC
22936 101016  024060                    .WORD   DUMPER
22937 101020  012746  006374            MOV     #WRD.9,-(SP)                            ;                                       1006
22938 101024  012746  007340            MOV     #WRD.76,-(SP)
22939 101030  012746  007636            MOV     #PHR.13,-(SP)
22940 101034  012746  006034            MOV     #THR.FMT,-(SP)
22941 101040  012746  000004            MOV     #4,-(SP)
22942 101044  010600                    MOV     SP,R0                                   ; SP,*
22943 101046  104414                    TRAP    14
22944 101050  010316                    MOV     R3,(SP)                                 ; BIT.CNT,*                             1006
22945 101052  010146                    MOV     R1,-(SP)                                ; WRD.CNT,*
22946 101054  012746  005606            MOV     #FMT.22,-(SP)
22947 101060  012746  000003            MOV     #3,-(SP)
22948 101064  010600                    MOV     SP,R0                                   ; SP,*
22949 101066  104414                    TRAP    14
22950 101070  062706  000020            ADD     #20,SP                                  ;                                       1006
22951 101074  005201          13$:      INC     R1                                      ; WRD.CNT                               1006
22952 101076  020127  000015            CMP     R1,#15                                  ; WRD.CNT,*
22953 101102  003735                    BLE     12$
22954 101104  104467                    TRAP    67                                      ;                                       1006
22955 101106  006000                    ROR     R0
22956 101110  103701                    BLO     10$
22957 101112  062706  000020            ADD     #20,SP                                  ;                                       1001
22958 101116  005203                    INC     R3                                      ; BIT.CNT                               1001
22959 101120  020327  000043            CMP     R3,#43                                  ; BIT.CNT,*
22960 101124  003002                    BGT     14$
22961 101126  000167  177174            JMP     1$
22962 101132  022626          14$:      CMP     (SP)+,(SP)+                             ;                                       9968
22963 101134  000207                    RTS     PC
22964
22965                           ; Routine Size:  206 words
22966                           ; Maximum stack depth per invocation:  24 words
22971
22972
22976
22977                                   .SBTTL  T55
22981 101136                    T55::
22982 101136  004767  177140    1$:     JSR     PC,$T55                                 ;                                       1007
22983 101142  104466                    TRAP    66
```

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22985                                   ;ML4                                    14-May-1981 13:48:54    TOPS
22986                                   ;                                       14-May-1981 13:05:08    PA:<
22987
22988 101144  006000                              ROR     R0
22989 101146  103773                              BLO     1$
22990 101150  000207                              RTS     PC
22991
22992                                   ; Routine Size:  6 words
22993                                   ; Maximum stack depth per invocation:  0 words
22998
22999
23000 ;         10074 !<BLF/PAGE>
```

```
23002 ;ML4
23003 ;
23004
23005 ;          10075 !
23006 ;          10076 BGNTST;
23007 ;          10077
23008 ;          10078 !++
23009 ;          10079 ! TEST NUMBER:  TST 56
23010 ;          10080 !
23011 ;          10081 ! TEST NAME:            ECC ERROR REGISTER TEST
23012 ;          10082 !
23013 ;          10083 ! TEST DESCRIPTION:
23014 ;          10084 !       TEST THE ECC ERROR REGISTER FOR
23015 ;          10085 !       CLEARING AND LATCHING OF ECC ERROR
23016 ;          10086 !       INFORMATION ON DETTECTION
23017 ;          10087 !       OF ECC ERRORS BY:
23018 ;          10088 !
23019 ;          10089 !       1.  THIS TEST IS TABLE DRIVEN.  DATA TABLE (DT_1)
23020 ;          10090 !           CONTAINS ERROR FORCING DATA AND EXPECTED
23021 ;          10091 !           MLEE DATA AS A RESULT OF THE FORCED ERROR
23022 ;          10092 !
23023 ;          10093 !       2.  THE TEST THEREFOR INDEXES INTO DT_1 TO FORCE
23024 ;          10094 !           AN ECC ERROR
23025 ;          10095 !
23026 ;          10096 !       3.  A MASS BUS READ TRANSFER IS DONE
23027 ;          10097 !
23028 ;          10098 !       4.  DT_1 IS AGAIN INDEXED AND ITS CONTENTS
23029 ;          10099 !           IS COMPARED AGAINST THE RESULTING
23030 ;          10100 !           MLEE REGISTER  CONTENTS
23031 ;          10101 !
23032 ;          10102 !       5.  A MASS BUS CLEAR IS DONE AN MLEE IS CHECKED FOR
23033 ;          10103 !           ZEROES
23034 ;          10104 !
23035 ;          10105 !       6.  THE ECH BIT IS ALSO EXAMINED FOR CORRECT
23036 ;          10106 !           LATCHING INFORMATION
23037 ;          10107 !
23038 ;          10108 !
23039 ;          10109 !
23040 ;          10110 !--
23041 ;          10111
23042 ;          10112 local
23043 ;          10113     FINISH,                          !VARIABLE ENDING CONDITION FOR LATCH_LOOP
23044 ;          10114     ERR_FLG;                         !ERROR FLAG
23045 ;          10115
23046 ;          10116 CLR_MBUS;                            !CLEAR THE DRIVE
23047 ;          10117 FINISH = 4;                          !MAKE LATCH_LOOP DO 5 LOOPS AT FIRST
23048 ;          10118
23049 ;          10119 incr CLR_LOOP from 0 to 1 do         !THE FIRST PASS TESTS MLEE FOR LATCHING
23050 ;          10120     !THE SECOND PASS TESTS MLEE FOR CLEARING
23051 ;          10121     begin
23052 ;          10122
23053 ;          10123     incr LATCH_LOOP from 0 to .FINISH do     !TEST MLEE FOR LATCHING BY USING DT_1 DATA
23054 ;          10124         begin
23055 ;          10125         BGNSUB;                      !START OF SCOPE LOOP
23056 ;          10126         ERR_FLG = ZERO;              !CLEAR THE ERROR FLAG
23057 ;ML4
23058 ;
```

```
23059
23060 ;          10127        MLER = ZEROES;                                  !CLEAR THE ERROR REGISTER
23061 ;          10128        ECC_DM = ONE;                                   !ENABLE ECC DIAG MODE
23062 ;          10129        PAR_CRC_WRD = .DT_1 [.LATCH_LOOP, P0_5];        !GET PAR_CRC_WRD DATA FROM DT_1
23063 ;          10130        CRC_A = .DT_1 [.LATCH_LOOP, A0_5];              !GET CRC_A FROM DT_1
23064 ;          10131        CRC_B = .DT_1 [.LATCH_LOOP, B0_5];              !GET CRC_B FROM DT_1
23065 ;          10132        GD_BLK_XFER ();                                 !SET UP A GOOD BLOCK TRANSFER
23066 ;          10133        ECC_DIS = ZERO;                                 !DISABLE ECC DIABLE
23067 ;          10134        MLCS1 = read;                                   !READ THE ERROR AND LACTH MLEE
23068 ;          10135        TIME_OUT_LOOP;
23069 ;          10136
23070 ;          10137        if .CRC_ERR neq .DT_1 [.LATCH_LOOP, CRC_DATA] then ERR_FLG = ONE;       !TEST CRC_ERR
23071 ;          10138
23072 ;          10139        if .SGL_ERR neq .DT_1 [.LATCH_LOOP, SGL_DATA] then ERR_FLG = ONE;       !TEST SGL_ERR
23073 ;          10140
23074 ;          10141        if .UNC_ERR neq .DT_1 [.LATCH_LOOP, UNC_DATA] then ERR_FLG = ONE;       !TEST UNC
23075 ;          10142
23076 ;          10143        if .BIT_IN_ERR neq .DT_1 [.LATCH_LOOP, E0_5] then ERR_FLG = ONE;        !TEST BIT IN ERROR
23077 ;          10144
23078 ;          10145        if .CHAN_IN_ERR neq .DT_1 [.LATCH_LOOP, C0_5] then ERR_FLG = ONE;       !TEST CHANNEL IN ERROR
23079 ;          10146
23080 ;          10147        if .ECH_ERR neq .DT_1 [.LATCH_LOOP, ECH_DATA]   !TEST IF ECH GOT SET
23081 ;          10148        then
23082 ;          10149            begin                                       !REPORT ERROR IF NOT SET
23083 ;          10150            ERRDF (123, ASYNC, DUMPER);
23084 ;          10151            PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_69, WRD_14);
23085 ;          10152            end;
23086 ;          10153
23087 ;          10154            if .ERR_FLG IS_SET                          !TEST IF THE ERROR FLAG GOT SET
23088 ;          10155            then
23089 ;          10156                begin                                   !REPORT ERROR IF SET
23090 ;          10157                ERRDF (124, SYNC, DUMPER);
23091 ;          10158                PRINTB (THR_FMT, REG_14, WRD_52, PHR_11);
23092 ;          10159                PRINTB (FMT_1, .DT_1 [.LATCH_LOOP, EE_DATA], .MLEE);
23093 ;          10160                PRINTB (FMT_19, .DT_1 [.LATCH_LOOP, B0_5], .DT_1 [.LATCH_LOOP, A0_5], .DT_1 [.LATCH_LOOP, P0_5])
23094 ;          10161                end;
23095 ;          10162
23096 ;          10163            ENDSUB;                                     !END OF SCOPE LOOP
23097 ;          10164            end;
23098 ;          10165
23099 ;          10166        CLR_MBUS;                                       !CLEAR THE REGISTER
23100 ;          10167
23101 ;          10168        if .MLEE neq ZERO                               !SEE IF THE REGISTER GOT CLEARED
23102 ;          10169        then
23103 ;          10170            begin                                       !REPORT ERROR IF NOT CLEARED
23104 ;          10171            ERRDF (125, SYNC, DUMPER);
23105 ;          10172            PRINTB (FOR_FMT, REG_14, WRD_52, FNC_7, WRD_14);
23106 ;          10173            end;
23107 ;          10174
23108 ;          10175        ECC_DM = ONE;                                   !ENABLE ECC DISABLE
23109 ;          10176        FINISH = ZERO;                                  !MAKE LATCH_LOOP LOOP ONCE TO CLEAR MLEE AGAIN
23110 ;          10177        end;
23111 ;          10178
23112 ;ML4                                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
23113 ;                                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (106)
23114
23115 ;          10179 ENDTST;
```

```
23119
23120                                          .SBTTL  $T56
23124 101152  004167  102740                $T56:   JSR     R1,$SAVE5                ;                                1007
23125 101156  152777  000040  112030                BISB    #40,@ML.REG+40           ;                                1011
23126 101164  016705  112412                        MOV     ML.DUT,R5
23127 101170  042705  177770                        BIC     #177770,R5
23128 101174  142777  000007  112012                BICB    #7,@ML.REG+40
23129 101202  150577  112006                        BISB    R5,@ML.REG+40
23130 101206  012746  000004                        MOV     #4,-(SP)                 ; *,FINISH                       1011
23131 101212  005046                                CLR     -(SP)                    ; CLR.LOOP                       1011
23132 101214  005004                          1$:   CLR     R4                       ; LATCH.LOOP                     1012
23133 101216  000167  000644                        JMP     16$
23134 101222  010446                          2$:   MOV     R4,-(SP)                 ; LATCH.LOOP,*                   1012
23135 101224  012746  000006                        MOV     #6,-(SP)
23136 101230  004767  102272                        JSR     PC,BL$MUL
23137 101234  010005                                MOV     R0,R5
23138 101236  012701  013534                        MOV     #DT.1,R1                 ;                                1013
23139 101242  060501                                ADD     R5,R1
23140 101244  012702  013536                        MOV     #DT.1+2,R2               ;                                1012
23141 101250  060502                                ADD     R5,R2
23142 101252  104402                          3$:   TRAP    2                        ;                                1012
23143 101254  005003                                CLR     R3                       ; ERR.FLG                        1012
23144 101256  005077  111752                        CLR     @ML.REG+60               ;                                1012
23145 101262  152777  000001  112004                BISB    #1,@ML.REG+120           ;                                1012
23146 101270  011200                                MOV     (R2),R0                  ;                                1012
23147 101272  006300                                ASL     R0
23148 101274  006300                                ASL     R0
23149 101276  042700  140377                        BIC     #140377,R0
23150 101302  042777  037400  112014                BIC     #37400,@ML.REG+150
23151 101310  050077  112010                        BIS     R0,@ML.REG+150
23152 101314  111200                                MOVB    (R2),R0                  ;                                1013
23153 101316  042700  177700                        BIC     #177700,R0
23154 101322  042777  000077  111774                BIC     #77,@ML.REG+150
23155 101330  050077  111770                        BIS     R0,@ML.REG+150
23156 101334  116500  013540                        MOVB    DT.1+4(R5),R0            ;                                1013
23157 101340  042700  177700                        BIC     #177700,R0
23158 101344  042777  000077  111762                BIC     #77,@ML.REG+160
23159 101352  050077  111756                        BIS     R0,@ML.REG+160
23160 101356  004767  114506                        JSR     PC,GD.BLK.XFER           ;                                1013
23161 101362  142777  000002  111704                BICB    #2,@ML.REG+120           ;                                1013
23162 101370  012777  000071  111556                MOV     #71,@ML.REG              ;                                1013
23163 101376  105777  111622                  4$:   TSTB    @ML.REG+50
23164 101402  100375                                BPL     4$
23165 101404  011146                                MOV     (R1),-(SP)               ;                                1013
23166 101406  042716  157777                        BIC     #157777,(SP)
23167                                         ;ML4                                                    14-May-1981 13:48:54    TOPS
23168                                         ;                                                       14-May-1981 13:05:08    PA:<
23169
23170 101412  017700  111746                        MOV     @ML.REG+210,R0
23171 101416  042700  157777                        BIC     #157777,R0
23172 101422  020026                                CMP     R0,(SP)+
23173 101424  001402                                BEQ     5$
23174 101426  012703  000001                        MOV     #1,R3                    ; *,ERR.FLG
23175 101432  011146                          5$:   MOV     (R1),-(SP)               ;                                1013
23176 101434  042716  137777                        BIC     #137777,(SP)
23177 101440  017700  111720                        MOV     @ML.REG+210,R0
23178 101444  042700  137777                        BIC     #137777,R0
```

```
23179 101450 020026                        CMP     R0,(SP)+
23180 101452 001402                        BEQ     6$
23181 101454 012703 000001                 MOV     #1,R3                ; *,ERR.FLG
23182 101460 011146                6$:     MOV     (R1),-(SP)           ;                                    1014
23183 101462 042716 077777                 BIC     #77777,(SP)
23184 101466 017700 111672                 MOV     @ML.REG+210,R0
23185 101472 042700 077777                 BIC     #77777,R0
23186 101476 020026                        CMP     R0,(SP)+
23187 101500 001402                        BEQ     7$
23188 101502 012703 000001                 MOV     #1,R3                ; *,ERR.FLG
23189 101506 111146                7$:     MOVB    (R1),-(SP)           ;                                    1014
23190 101510 042716 177700                 BIC     #177700,(SP)
23191 101514 117700 111644                 MOVB    @ML.REG+210,R0
23192 101520 042700 177700                 BIC     #177700,R0
23193 101524 020026                        CMP     R0,(SP)+
23194 101526 001402                        BEQ     8$
23195 101530 012703 000001                 MOV     #1,R3                ; *,ERR.FLG
23196 101534 011146                8$:     MOV     (R1),-(SP)           ;                                    1014
23197 101536 042716 170077                 BIC     #170077,(SP)
23198 101542 017700 111616                 MOV     @ML.REG+210,R0
23199 101546 042700 170077                 BIC     #170077,R0
23200 101552 020026                        CMP     R0,(SP)+
23201 101554 001402                        BEQ     9$
23202 101556 012703 000001                 MOV     #1,R3                ; *,ERR.FLG
23203 101562 011246                9$:     MOV     (R2),-(SP)           ;                                    1014
23204 101564 005046                        CLR     -(SP)
23205 101566 032766 010000 000002          BIT     #10000,2(SP)
23206 101574 001401                        BEQ     10$
23207 101576 005216                        INC     (SP)
23208 101600 005000                10$:    CLR     R0
23209 101602 132777 000100 111424          BITB    #100,@ML.REG+60
23210 101610 001401                        BEQ     11$
23211 101612 005200                        INC     R0
23212 101614 020026                11$:    CMP     R0,(SP)+
23213 101616 001002                        BNE     12$
23214 101620 005726                        TST     (SP)+
23215 101622 000425                        BR      13$
23216 101624 005726                12$:    TST     (SP)+
23217 101626 104455                        TRAP    55                   ;                                    1015
23218 101630 000173                        .WORD   173
23219 101632 010464                        .WORD   ASYNC
23220 101634 024060                        .WORD   DUMPER
23221 101636 012746 006442                 MOV     #WRD.14,-(SP)        ;                                    1015
23222                              ;ML4                                                 14-May-1981 13:48:54  TOPS
23223                              ;                                                    14-May-1981 13:05:08  PA:<
23224
23225 101642 012746 007252                 MOV     #WRD.69,-(SP)
23226 101646 012746 006406                 MOV     #WRD.10,-(SP)
23227 101652 012746 007240                 MOV     #WRD.67,-(SP)
23228 101656 012746 006046                 MOV     #FOR.FMT,-(SP)
23229 101662 012746 000005                 MOV     #5,-(SP)
23230 101666 010600                        MOV     SP,R0                ; SP,*
23231 101670 104414                        TRAP    14
23232 101672 062706 000014                 ADD     #14,SP               ;                                    1014
23233 101676 020327 000001         13$:    CMP     R3,#1                ; ERR.FLG,*                          1015
23234 101702 001062                        BNE     14$
23235 101704 104455                        TRAP    55                   ;                                    1015
```

```
23236 101706 000174                    .WORD   174
23237 101710 010526                    .WORD   SYNC
23238 101712 024060                    .WORD   DUMPER
23239 101714 012746 007576             MOV     #PHR.11,-(SP)           ;                                       1015
23240 101720 012746 007066             MOV     #WRD.52,-(SP)
23241 101724 012746 010376             MOV     #REG.14,-(SP)
23242 101730 012746 006034             MOV     #THR.FMT,-(SP)
23243 101734 012746 000004             MOV     #4,-(SP)
23244 101740 010600                    MOV     SP,R0                   ; SP,*
23245 101742 104414                    TRAP    14
23246 101744 017716 111414             MOV     @ML.REG+210,(SP)        ;                                       1015
23247 101750 011146                    MOV     (R1),-(SP)
23248 101752 012746 004222             MOV     #FMT.1,-(SP)
23249 101756 012746 000003             MOV     #3,-(SP)
23250 101762 010600                    MOV     SP,R0                   ; SP,*
23251 101764 104414                    TRAP    14
23252 101766 011200                    MOV     (R2),R0                 ;                                       1016
23253 101770 006200                    ASR     R0
23254 101772 006200                    ASR     R0
23255 101774 006200                    ASR     R0
23256 101776 006200                    ASR     R0
23257 102000 006200                    ASR     R0
23258 102002 006200                    ASR     R0
23259 102004 042700 177700             BIC     #177700,R0
23260 102010 010016                    MOV     R0,(SP)
23261 102012 111246                    MOVB    (R2),-(SP)
23262 102014 042716 177700             BIC     #177700,(SP)
23263 102020 116546 013540             MOVB    DT.1+4(R5),-(SP)
23264 102024 042716 177700             BIC     #177700,(SP)
23265 102030 012746 005412             MOV     #FMT.19,-(SP)
23266 102034 012746 000004             MOV     #4,-(SP)
23267 102040 010600                    MOV     SP,R0                   ; SP,*
23268 102042 104414                    TRAP    14
23269 102044 062706 000030             ADD     #30,SP                  ;                                       1015
23270 102050 104467             14$:   TRAP    67                      ;                                       1016
23271 102052 006000                    ROR     R0
23272 102054 103002                    BHIS    15$
23273 102056 000167 177170             JMP     3$
23274 102062 022626             15$:   CMP     (SP)+,(SP)+             ;                                       1012
23275 102064 005204                    INC     R4                      ; LATCH.LOOP                            1012
23276 102066 020466 000002      16$:   CMP     R4,2(SP)                ; LATCH.LOOP,FINISH
23277                           ;ML4                                                   14-May-1981 13:48:54    TOPS
23278                           ;                                                      14-May-1981 13:05:08    PA:<
23279
23280 102072 003002                    BGT     17$
23281 102074 000167 177122             JMP     2$
23282 102100 152777 000040 111106 17$: BISB    #40,@ML.REG+40          ;                                       1016
23283 102106 016705 111470             MOV     ML.DUT,R5
23284 102112 042705 177770             BIC     #177770,R5
23285 102116 142777 000007 111070      BICB    #7,@ML.REG+40
23286 102124 150577 111064             BISB    R5,@ML.REG+40
23287 102130 005777 111230             TST     @ML.REG+210             ;                                       1016
23288 102134 001424                    BEQ     18$
23289 102136 104455                    TRAP    55                      ;                                       1017
23290 102140 000175                    .WORD   175
23291 102142 010526                    .WORD   SYNC
23292 102144 024060                    .WORD   DUMPER
```

```
23293 102146  012746  006442                MOV     #WRD.14,-(SP)                   ;                                       1017
23294 102152  012746  010012                MOV     #FNC.7,-(SP)
23295 102156  012746  007066                MOV     #WRD.52,-(SP)
23296 102162  012746  010376                MOV     #REG.14,-(SP)
23297 102166  012746  006046                MOV     #FOR.FMT,-(SP)
23298 102172  012746  000005                MOV     #5,-(SP)
23299 102176  010600                        MOV     SP,R0                           ; SP,*
23300 102200  104414                        TRAP    14
23301 102202  062706  000014                ADD     #14,SP                          ;                                       1017
23302 102206  152777  000001  111060  18$:  BISB    #1,@ML.REG+120                  ;                                       1017
23303 102214  005066  000002                CLR     2(SP)                           ; FINISH                                1017
23304 102220  005216                        INC     (SP)                            ; CLR.LOOP                              1011
23305 102222  021627  000001                CMP     (SP),#1                         ; CLR.LOOP,*
23306 102226  003002                        BGT     19$
23307 102230  000167  176760                JMP     1$
23308 102234  022626                19$:    CMP     (SP)+,(SP)+                     ;                                       1007
23309 102236  000207                        RTS     PC
23310
23311                               ; Routine Size:  283 words
23312                               ; Maximum stack depth per invocation:  22 words
23317
23318
23322
23323                                       .SBTTL  T56
23327 102240                        T56::
23328 102240  004767  176706        1$:     JSR     PC,$T56                         ;                                       1017
23329 102244  104466                        TRAP    66
23330 102246  006000                        ROR     R0
23331 102250  103773                        BLO     1$
23332                               ;ML4                                                    14-May-1981 13:48:54    TOPS
23333                               ;                                                       14-May-1981 13:05:08    PA:<
23334
23335 102252  000207                        RTS     PC
23336
23337                               ; Routine Size:  6 words
23338                               ; Maximum stack depth per invocation:  0 words
23343
23344
23345 ;          10180 !<BLF/PAGE>
```

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14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (107)

```
23347 ;ML4
23348 ;
23349
23350 ;          10181 !
23351 ;          10182 BGNTST;
23352 ;          10183
23353 ;          10184 !++
23354 ;          10185 ! TEST NUMBER:  TST 57
23355 ;          10186 !
23356 ;          10187 ! TEST NAME:            ECC ERROR LOCATION REGISTER TEST
23357 ;          10188 !
23358 ;          10189 ! TEST DESCRIPTION:
23359 ;          10190 !       TEST THE ECC ERROR LOCATION REGISTER FOR CLOCKING, BIT UNIQUENESS
23360 ;          10191 !       CLEARING AND LATCHING OF DSA ADDRESSES ON DETECTION OF ECC ERROR BY:
23361 ;          10192 !
23362 ;          10193 !       1.  TEST FOR CLOCKING BY:
23363 ;          10194 !           A. DO A MASS BUS CLEAR FORCING REGISTER BITS TO ZEROES
23364 ;          10195 !           B. FORCE AN ECC ERROR AT THE LAST BLOCK AND DO A READ TRANSFER
23365 ;          10196 !           C. CHECK MLEL FOR LAST BLOCK ADDRESS
23366 ;          10197 !
23367 ;          10198 !       2.  TEST FOR BIT UNIQUENESS BY:
23368 ;          10199 !           A. WITH FORCED ECC ERRORS DO READ TRANSFERS AT VARIOUS DSA
23369 ;          10200 !              ADDRESSES AND CHECK MLEL FOR LATCHED DSA ADDRESSES
23370 ;          10201 !           B. DO CLEAR AND REPEAT
23371 ;          10202 !
23372 ;          10203 !       3.  TEST FOR LATCHING AND CLEARING BY:
23373 ;          10204 !           A. WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT THE
23374 ;          10205 !              LAST BLOCK. (LATCHES MLEL WITH THE LAST BLOCK ADDRESS TO START THE TEST OFF)
23375 ;          10206 !           B. AGAIN WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT DSA
23376 ;          10207 !              ZERO AND CHECK MLEL FOR NOT LATCHING.
23377 ;          10208 !              NO CLEAR DONE
23378 ;          10209 !           C. WITH FORCED UNCORRECTABLE ERRORS DO A READ TRANSFER AT DSA
23379 ;          10210 !              ZERO  CHECK MLEL FOR LATCHED DSA ZERO
23380 ;          10211 !              NO CLEAR DONE
23381 ;          10212 !           D. WITH FORCED SINGLE BIT ERRORS DO A READ TRANSFER AT THE LAST
23382 ;          10213 !              BLOCK AND CHECK MLEL FOR NOT LATCHING
23383 ;          10214 !              NO CLEAR DONE
23384 ;          10215 !           E. WITH A FORCED UNCORRECTABLE ERROR DO A READ TRANSFER AT
23385 ;          10216 !              THE LAST BLOCK AN CHECK MLEL FOR NOT LATCHING
23386 ;          10217 !           F. DO A MASS BUS CLEAR
23387 ;          10218 !           G. WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT THE
23388 ;          10219 !              LAST BLOCK
23389 ;          10220 !           H. DO A MASS BUS CLEAR AGAIN AND CHECK MLEL FOR ZEROES
23390 ;          10221 !
23391 ;          10222 ! IMPLICIT INPUTS:
23392 ;          10223 !       IO_BUF
23393 ;          10224 !       A VECTOR OF 256 WORDS WHERE DATA
23394 ;          10225 !       FOR MBUS READS AND WRITES TRANSFERS
23395 ;          10226 !       IS FOUND.
23396 ;          10227 !
23397 ;          10228 !
23398 ;          10229 !--
23399 ;          10230
23400 ;          10231 local
23401 ;          10232     SGL.                                  !SINGLE BIT ERROR PARRAMETER
```

```
23403 ;ML4
23404 ;
23405 ;
23406 ;          10233      UNC,                                !UNCORRECTABLE ERR PARRAMETER
23407 ;          10234      SAVE,                               !TEMPORY SAVE LOCATION
23408 ;          10235      SHF_DATA,                           !SHIFTING DATA PATTERN SAVE LOCATION
23409 ;          10236      DSA_PAT;                            !EXPECTED DSA PATTERN LATCHED IN MLEL
23410 ;          10237
23411 ;          10238 BGNSUB;                                  !START OF SCOPE LOOP
23412 ;          10239 CLR_MBUS;                                !CLEAR THE MLEL REGISTER
23413 ;          10240 FOR_ECC_ERR (SGL = 1, UNC = 0);          !FORCE A SBE
23414 ;          10241 MLDA = .LST_BLK;                         !LATCH THE LAST BLK ADRS INTO THE MLEL
23415 ;          10242 MLWC = not 255;
23416 ;          10243 MLBA = IO_BUF;
23417 ;          10244 MLCS1 = read;                            !DO A READ AND LATCH THE MLEL
23418 ;          10245 TIME_OUT_LOOP;
23419 ;          10246
23420 ;          10247 if .MLEL eql ZEROES                      !SEE IF THE MLEL GOT CLOCKED
23421 ;          10248 then
23422 ;          10249     begin                                !REPORT AN ERROR IF NOT CLOCKED
23423 ;          10250     ERRDF (126, SYNC, DUMPER);
23424 ;          10251     PRINTB (THR_FMT, REG_15, WRD_52, PHR_11);
23425 ;          10252     EXIT_TST;
23426 ;          10253     end;
23427 ;          10254
23428 ;          10255 ENDSUB;                                  !END OF SCOPE LOOP
23429 ;          10256 SHF_DATA = .LST_ARR;                     !LOAD  THE SHIFT DATA
23430 ;          10257
23431 ;          10258 incr LOOP from 0 to 16 do                !FIRST TEST FOR 1'S AND 0'S THEN SHIFT DATA
23432 ;          10259     begin
23433 ;          10260     BGNSUB;                              !START OF SCOPE LOOP
23434 ;          10261     CLR_MBUS;                            !CLEAR THE DRIVE
23435 ;          10262     FOR_ECC_ERR (SGL = 1, UNC = 0);      !FORCE A SBE
23436 ;          10263
23437 ;          10264     selectone .LOOP of                   !SELECT THE TEST PATTERN
23438 ;          10265         set
23439 ;          10266
23440 ;          10267         [0] :                            !ZEROES PATTERN
23441 ;          10268             begin
23442 ;          10269             DSA_PAT = ZEROES;
23443 ;          10270             MLDA = .DSA_PAT;
23444 ;          10271             end;
23445 ;          10272
23446 ;          10273         [1] :                            !MOSTLY ONES PATTERN
23447 ;          10274             begin
23448 ;          10275             DSA_PAT = .LST_BLK;
23449 ;          10276             MLDA = .DSA_PAT;
23450 ;          10277             end;
23451 ;          10278
23452 ;          10279         [otherwise] :                    !SHIFT PATTERN
23453 ;          10280             begin
23454 ;          10281             DSA_PAT = .SHF_DATA;
23455 ;          10282             MLDA = .SHF_DATA;
23456 ;          10283             SHF_DATA = .SHF_DATA^-ONE;
23457 ;          10284             end;
```

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23459 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
23460 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (107)
23461 ;
23462 ;          10285          tes;
23463 ;          10286
23464 ;          10287      MLWC = not 255;                   !SET UP THE TRANSFER
23465 ;          10288      MLBA = IO_BUF;
23466 ;          10289      MLCS1 = read;                     !DO THE TRANSFER AND LATCH MLEL
23467 ;          10290      TIME_OUT_LOOP;
23468 ;          10291      SAVE = .MLEL;                     !READ AND SAVE THE MLEL REGISTER
23469 ;          10292
23470 ;          10293      if .SAVE neq .DSA_PAT             !SEE IF SAVE IS WHAT WE EXPECTED
23471 ;          10294      then
23472 ;          10295          begin                         !REPORT AN ERROR IF NOT THE SAME
23473 ;          10296          ERRDF (127, ASYNC, DUMPER);
23474 ;          10297          PRINTB (TWO_FMT, REG_15, PHR_4);
23475 ;          10298          PRINTB (FMT_2, .DSA_PAT, .SAVE, (.DSA_PAT xor .SAVE));
23476 ;          10299          end;
23477 ;          10300
23478 ;          10301      ENDSUB;                           !END OF SCOPE LOOP
23479 ;          10302      end;
23480 ;          10303
23481 ;          10304 CLR_MBUS;                              !CLEAR THE DRIVE
23482 ;          10305 FOR_ECC_ERR (SGL = 1, UNC = 0);        !FORCE A SBE
23483 ;          10306 MLWC = not 255;                        !SET UP A LAST BLOCK TRANSFER
23484 ;          10307 MLBA = IO_BUF;                         !TO LATCH THE MLEL WITH T
23485 ;          10308 MLDA = .LST_BLK;
23486 ;          10309 MLCS1 = read;
23487 ;          10310 TIME_OUT_LOOP;
23488 ;          10311
23489 ;          10312 incr LOOP from 0 to 4 do               !NOW TEST FOR CORRECT LATCHING
23490 ;          10313     begin
23491 ;          10314     BGNSUB;                           !START OF SCOPE LOOP
23492 ;          10315     MLER = ZEROES;                    !CLEAR THE ERROR REGISTER
23493 ;          10316
23494 ;          10317     case .LOOP from 0 to 4 of         !SELECT TEST DATA
23495 ;          10318         set
23496 ;          10319
23497 ;          10320         [0] :                         !FORCE A SBE AND CHECK FOR THE LST BLK ADRS
23498 ;          10321             begin
23499 ;          10322             SGL = 1;
23500 ;          10323             UNC = 0;
23501 ;          10324             DSA_PAT = .LST_BLK;
23502 ;          10325             MLDA = ZEROES;
23503 ;          10326             end;
23504 ;          10327
23505 ;          10328         [1] :                         !FORCE A UNC ERROR AND CHECK FOR ADRS ZERO
23506 ;          10329             begin
23507 ;          10330             SGL = 0;
23508 ;          10331             UNC = 1;
23509 ;          10332             DSA_PAT = ZEROES;
23510 ;          10333             MLDA = ZEROES;
23511 ;          10334             end;
23512 ;          10335
23513 ;          10336         [2] :                         !FORCE SBE AND CHECK FOR ADRS ZERO
```

```
23515 ;ML4
23516 ;
23517
23518 ;          10337              begin
23519 ;          10338              SGL = 1;
23520 ;          10339              UNC = 0;
23521 ;          10340              DSA_PAT = ZEROES;
23522 ;          10341              MLDA = .LST_BLK;
23523 ;          10342              end;
23524 ;          10343
23525 ;          10344          [3] :                          !FORCE UNC ERROR AND CHECK FOR ADRS ZERO
23526 ;          10345              begin
23527 ;          10346              SGL = 0;
23528 ;          10347              UNC = 1;
23529 ;          10348              DSA_PAT = ZEROES;
23530 ;          10349              MLDA = .LST_BLK;
23531 ;          10350              end;
23532 ;          10351
23533 ;          10352          [4] :                          !FORCE SBE AND CHECK FOR ADRS ZERO
23534 ;          10353              begin
23535 ;          10354              CLR_MBUS;
23536 ;          10355              SGL = 1;
23537 ;          10356              UNC = 0;
23538 ;          10357              DSA_PAT = ZEROES;
23539 ;          10358              MLDA = .LST_BLK;
23540 ;          10359              end;
23541 ;          10360          tes;
23542 ;          10361
23543 ;          10362      FOR_ECC_ERR (.SGL, .UNC);          !FORCE SELECTED FORCED ERROR INTO ML11
23544 ;          10363      MLWC = not 255;                    !SET UP A TRANSFER
23545 ;          10364      MLBA = IO_BUF;
23546 ;          10365      MLCS1 = read;                      !READ THE ERROR OUT AND LATCH MLEL
23547 ;          10366      TIME_OUT_LOOP;
23548 ;          10367
23549 ;          10368      if .LOOP neq 4                     !TEST THE REG FOR LATCH DATA IF LOOP NEQ 4
23550 ;          10369      then
23551 ;          10370          SAVE = .MLEL
23552 ;          10371      else
23553 ;          10372          begin                          !ELSE TEST THE REG FOR CLEAR
23554 ;          10373          CLR_MBUS;
23555 ;          10374          SAVE = .MLEL;
23556 ;          10375          end;
23557 ;          10376
23558 ;          10377      if .SAVE neq .DSA_PAT              !SEE IF THE REG LATCHED  OK
23559 ;          10378      then
23560 ;          10379          begin                          !REPORT ERROR IF NOT LATCHED
23561 ;          10380          ERRDF (128, SYNC, DUMPER);
23562 ;          10381          PRINTB (THR_FMT, REG_15, WRD_71, WRD_10);
23563 ;          10382          PRINTB (FMT_1, .DSA_PAT, .SAVE)
23564 ;          10383          end;
23565 ;          10384
23566 ;          10385      ENDSUB;                            !END OF SCOPE LOOP
23567 ;          10386      end;
23568 ;          10387
23569 ;          10388 ENDTST;
```

```
23571 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
23572 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (107)
23573
23577
23578                                       .SBTTL  $T57
23582 102254  004167  101636        $T57:   JSR     R1,$SAVE5                       ;                       1017
23583 102260  005746                        TST     -(SP)
23584 102262  104402                1$:     TRAP    2                               ;                       1023
23585 102264  152777  000040  110722        BISB    #40,@ML.REG+40                  ;                       1023
23586 102272  016705  111304                MOV     ML.DUT,R5
23587 102276  042705  177770                BIC     #177770,R5
23588 102302  142777  000007  110704        BICB    #7,@ML.REG+40
23589 102310  150577  110700                BISB    R5,@ML.REG+40
23590 102314  012703  000001                MOV     #1,R3                           ; *,SGL                 1024
23591 102320  010346                        MOV     R3,-(SP)                        ; SGL,*
23592 102322  005001                        CLR     R1                              ; UNC
23593 102324  005046                        CLR     -(SP)
23594 102326  004767  113426                JSR     PC,FOR.ECC.ERR
23595 102332  016777  107234  110644        MOV     LST.BLK,@ML.REG+30              ;                       1024
23596 102340  012777  177400  110616        MOV     #-400,@ML.REG+10                ;                       1024
23597 102346  012777  011600  110620        MOV     #IO.BUF,@ML.REG+20              ;                       1024
23598 102354  012777  000071  110572        MOV     #71,@ML.REG                     ;                       1024
23599 102362  105777  110636          2$:   TSTB    @ML.REG+50
23600 102366  100375                        BPL     2$
23601 102370  005777  111000                TST     @ML.REG+220                     ;                       1024
23602 102374  001025                        BNE     3$
23603 102376  104455                        TRAP    55                              ;                       1025
23604 102400  000176                        .WORD   176
23605 102402  010526                        .WORD   SYNC
23606 102404  024060                        .WORD   DUMPER
23607 102406  012746  007576                MOV     #PHR.11,-(SP)                   ;                       1025
23608 102412  012746  007066                MOV     #WRD.52,-(SP)
23609 102416  012746  010404                MOV     #REG.15,-(SP)
23610 102422  012746  006034                MOV     #THR.FMT,-(SP)
23611 102426  012746  000004                MOV     #4,-(SP)
23612 102432  010600                        MOV     SP,R0                           ; SP,*
23613 102434  104414                        TRAP    14
23614 102436  104463                        TRAP    63
23615 102440  062706  000016                ADD     #16,SP                          ;                       1024
23616 102444  000167  001006                JMP     26$                             ;                       1024
23617 102450  022626            3$:         CMP     (SP)+,(SP)+                     ;                       1023
23618 102452  104467                        TRAP    67                              ;                       1025
23619 102454  006000                        ROR     R0
23620 102456  103701                        BLO     1$
23621 102460  016705  107112                MOV     LST.ARR,R5                      ; *,SHF.DATA            1025
23622 102464  005002                        CLR     R2                              ; LOOP                  1025
23623 102466  104402                4$:     TRAP    2                               ;                       1025
23624 102470  152777  000040  110516        BISB    #40,@ML.REG+40                  ;                       1026
23625 102476  016700  111100                MOV     ML.DUT,R0
```

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23627                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
23628                                   ;                                                       14-May-1981 13:05:08    PA:<
23629
23630 102502  042700  177770                    BIC     #177770,R0
23631 102506  142777  000007  110500            BICB    #7,@ML.REG+40
23632 102514  150077  110474                    BISB    R0,@ML.REG+40
23633 102520  012703  000001                    MOV     #1,R3                   ; *,SGL                 1026
23634 102524  010346                            MOV     R3,-(SP)                ; SGL,*
23635 102526  005001                            CLR     R1                      ; UNC
23636 102530  005046                            CLR     -(SP)
23637 102532  004767  113222                    JSR     PC,FOR.ECC.ERR
23638 102536  005702                            TST     R2                      ; LOOP                  1026
23639 102540  001002                            BNE     5$
23640 102542  005004                            CLR     R4                      ; DSA.PAT               1026
23641 102544  000405                            BR      6$                      ;                       1027
23642 102546  020227  000001          5$:       CMP     R2,#1                   ; LOOP,*                1026
23643 102552  001005                            BNE     7$
23644 102554  016704  107012                    MOV     LST.BLK,R4              ; *,DSA.PAT             1027
23645 102560  010477  110420          6$:       MOV     R4,@ML.REG+30           ; DSA.PAT,*             1027
23646 102564  000404                            BR      8$                      ;                       1026
23647 102566  010504                  7$:       MOV     R5,R4                   ; SHF.DATA,DSA.PAT      1028
23648 102570  010577  110410                    MOV     R5,@ML.REG+30           ; SHF.DATA,*            1028
23649 102574  006205                            ASR     R5                      ; SHF.DATA              1028
23650 102576  012777  177400  110360  8$:       MOV     #-400,@ML.REG+10        ;                       1028
23651 102604  012777  011600  110362            MOV     #IO.BUF,@ML.REG+20      ;                       1028
23652 102612  012777  000071  110334            MOV     #71,@ML.REG             ;                       1028
23653 102620  105777  110400          9$:       TSTB    @ML.REG+50
23654 102624  100375                            BPL     9$
23655 102626  017766  110542  000004            MOV     @ML.REG+220,4(SP)       ; *,SAVE                1029
23656 102634  026604  000004                    CMP     4(SP),R4                ; SAVE,DSA.PAT          1029
23657 102640  001441                            BEQ     10$
23658 102642  104455                            TRAP    55                      ;                       1029
23659 102644  000177                            .WORD   177
23660 102646  010464                            .WORD   ASYNC
23661 102650  024060                            .WORD   DUMPER
23662 102652  012746  007454                    MOV     #PHR.4,-(SP)            ;                       1029
23663 102656  012746  010404                    MOV     #REG.15,-(SP)
23664 102662  012746  006024                    MOV     #TWO.FMT,-(SP)
23665 102666  012746  000003                    MOV     #3,-(SP)
23666 102672  010600                            MOV     SP,R0                   ; SP,*
23667 102674  104414                            TRAP    14
23668 102676  016616  000014                    MOV     14(SP),(SP)             ; SAVE,*                1029
23669 102702  010446                            MOV     R4,-(SP)                ; DSA.PAT,*
23670 102704  046616  000002                    BIC     2(SP),(SP)
23671 102710  040466  000002                    BIC     R4,2(SP)                ; DSA.PAT,*
23672 102714  052616                            BIS     (SP)+,(SP)
23673 102716  016646  000014                    MOV     14(SP),-(SP)            ; SAVE,*
23674 102722  010446                            MOV     R4,-(SP)                ; DSA.PAT,*
23675 102724  012746  004266                    MOV     #FMT.2,-(SP)
23676 102730  012746  000004                    MOV     #4,-(SP)
23677 102734  010600                            MOV     SP,R0                   ; SP,*
23678 102736  104414                            TRAP    14
23679 102740  062706  000020                    ADD     #20,SP                  ;                       1029
23680 102744  022626                  10$:      CMP     (SP)+,(SP)+             ;                       1025
23681 102746  104467                            TRAP    67                      ;                       1029
```

```
23683                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
23684                                   ;                                                       14-May-1981 13:05:08    PA:<
23685
23686 102750  006000                            ROR     R0
23687 102752  103645                            BLO     4$
23688 102754  005202                            INC     R2                              ; LOOP                          1025
23689 102756  020227  000020                    CMP     R2,#20                          ; LOOP,*
23690 102762  003641                            BLE     4$
23691 102764  152777  000040  110222            BISB    #40,@ML.REG+40                  ;                               1030
23692 102772  016705  110604                    MOV     ML.DUT,R5
23693 102776  042705  177770                    BIC     #177770,R5
23694 103002  142777  000007  110204            BICB    #7,@ML.REG+40
23695 103010  150577  110200                    BISB    R5,@ML.REG+40
23696 103014  012703  000001                    MOV     #1,R3                           ; *,SGL                         1030
23697 103020  010346                            MOV     R3,-(SP)                        ; SGL,*
23698 103022  005001                            CLR     R1                              ; UNC
23699 103024  005046                            CLR     -(SP)
23700 103026  004767  112726                    JSR     PC,FOR.ECC.ERR
23701 103032  012777  177400  110124            MOV     #-400,@ML.REG+10                ;                               1030
23702 103040  012777  011600  110126            MOV     #IO.BUF,@ML.REG+20              ;                               1030
23703 103046  016777  106520  110130            MOV     LST.BLK,@ML.REG+30              ;                               1030
23704 103054  012777  000071  110072            MOV     #71,@ML.REG                     ;                               1030
23705 103062  105777  110136          11$:      TSTB    @ML.REG+50
23706 103066  100375                            BPL     11$
23707 103070  005002                            CLR     R2                              ; LOOP                          1031
23708 103072  104402                  12$:      TRAP    2                               ;                               1031
23709 103074  005077  110134                    CLR     @ML.REG+60                      ;                               1031
23710 103100  010205                            MOV     R2,R5                           ; LOOP,*                        1031
23711 103102  006305                            ASL     R5
23712 103104  066507  103110                    ADD     13$(R5),PC
23713 103110  000012                  13$:      .WORD   14$-13$
23714 103112  000026                            .WORD   15$-13$
23715 103114  000044                            .WORD   17$-13$
23716 103116  000046                            .WORD   18$-13$
23717 103120  000056                            .WORD   19$-13$
23718 103122  012703  000001          14$:      MOV     #1,R3                           ; *,SGL                         1032
23719 103126  005001                            CLR     R1                              ; UNC                           1032
23720 103130  016704  106436                    MOV     LST.BLK,R4                      ; *,DSA.PAT                     1032
23721 103134  000404                            BR      16$                             ;                               1032
23722 103136  005003                  15$:      CLR     R3                              ; SGL                           1033
23723 103140  012701  000001                    MOV     #1,R1                           ; *,UNC                         1033
23724 103144  005004                            CLR     R4                              ; DSA.PAT                       1033
23725 103146  005077  110032          16$:      CLR     @ML.REG+30                      ;                               1033
23726 103152  000430                            BR      22$                             ;                               1031
23727 103154  000420                  17$:      BR      20$                             ;                               1033
23728 103156  005003                  18$:      CLR     R3                              ; SGL                           1034
23729 103160  012701  000001                    MOV     #1,R1                           ; *,UNC                         1034
23730 103164  000417                            BR      21$                             ;                               1034
23731 103166  152777  000040  110020  19$:      BISB    #40,@ML.REG+40                  ;                               1035
23732 103174  016705  110402                    MOV     ML.DUT,R5
23733 103200  042705  177770                    BIC     #177770,R5
23734 103204  142777  000007  110002            BICB    #7,@ML.REG+40
23735 103212  150577  107776                    BISB    R5,@ML.REG+40
23736 103216  012703  000001          20$:      MOV     #1,R3                           ; *,SGL                         1035
23737 103222  005001                            CLR     R1                              ; UNC                           1035
```

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                                        ;ML4                                                    14-May-1981 13:48:54    TOPS
                                        ;                                                       14-May-1981 13:05:08    PA:<
                                21$:    CLR     R4                      ; DSA.PAT                                       1035
                                        MOV     LST.BLK,@ML.REG+30      ;                                               1035
                                22$:    MOV     R3,-(SP)                ; SGL,*                                         1036
                                        MOV     R1,-(SP)                ; UNC,*
                                        JSR     PC,FOR.ECC.ERR
                                        MOV     #-400,@ML.REG+10        ;                                               1036
                                        MOV     #IO.BUF,@ML.REG+20      ;                                               1036
                                        MOV     #71,@ML.REG             ;                                               1036
                                23$:    TSTB    @ML.REG+50
                                        BPL     23$
                                        CMP     R2,#4                   ; LOOP,*                                        1036
                                        BNE     24$                     ;                                               1037
                                        BISB    #40,@ML.REG+40          ;                                               1037
                                        MOV     ML.DUT,R5
                                        BIC     #177770,R5
                                        BICB    #7,@ML.REG+40
                                        BISB    R5,@ML.REG+40
                                24$:    MOV     @ML.REG+220,10(SP)      ; *,SAVE                                        1037
                                        CMP     10(SP),R4               ; SAVE,DSA.PAT                                  1037
                                        BEQ     25$
                                        TRAP    55                      ;                                               1038
                                        .WORD   200
                                        .WORD   SYNC
                                        .WORD   DUMPER
                                        MOV     #WRD.10,-(SP)           ;                                               1038
                                        MOV     #WRD.71,-(SP)
                                        MOV     #REG.15,-(SP)
                                        MOV     #THR.FMT,-(SP)
                                        MOV     #4,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        MOV     22(SP),(SP)             ; SAVE,*                                        1038
                                        MOV     R4,-(SP)                ; DSA.PAT,*
                                        MOV     #FMT.1,-(SP)
                                        MOV     #3,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        ADD     #20,SP                  ;                                               1037
                                25$:    CMP     (SP)+,(SP)+             ;                                               1031
                                        TRAP    67                      ;                                               1038
                                        ROR     R0
                                        BLO     12$
                                        INC     R2                      ; LOOP                                          1031
                                        CMP     R2,#4                   ; LOOP,*
                                        BLE     12$
                                        CMP     (SP)+,(SP)+             ;                                               1017
                                26$:    TST     (SP)+
                                        RTS     PC

                                ; Routine Size:  323 words
                                ; Maximum stack depth per invocation:  19 words
```

```
23801
23802
23806
23807                                   .SBTTL  T57
23811 103462                    T57::
23812 103462  004767  176566  1$:     JSR     PC,$T57                 ;       1038
23813 103466  104466                  TRAP    66
23814 103470  006000                  ROR     R0
23815 103472  103773                  BLO     1$
23816 103474  000207                  RTS     PC
23817
23818                           ; Routine Size:  6 words
23819                           ; Maximum stack depth per invocation:  0 words
23824
23825
23826 ;          10389 !<BLF/PAGE>
```

```
23828 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
23829 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (108)
23830 ;
23831 ;          10390 !
23832 ;          10391 BGNTST;
23833 ;          10392
23834 ;          10393 !++
23835 ;          10394 ! TEST NUMBER:  TST 58
23836 ;          10395 !
23837 ;          10396 ! TEST NAME:              ECC HARD ERROR BIT TEST
23838 ;          10397 !
23839 ;          10398 ! TEST DESCRIPTION:
23840 ;          10399 !       VIA ECC_DM AND ECC_DIS TEST THE
23841 ;          10400 !       ECH BIT FOR SETTING AND NOT SETTING BY:
23842 ;          10401 !
23843 ;          10402 !       1.  VIA ECC_DM AND A WRITE TRANSFER FORCE
23844 ;          10403 !           ECC ERRORS INTO THE ML11'S GOOD BLOCK
23845 ;          10404 !
23846 ;          10405 !       2.  WITH ECC_DM = 0 AND ECC_DIS = 0
23847 ;          10406 !           DO A READ TRANSFER AND CHECK ECH SET
23848 ;          10407 !
23849 ;          10408 !       3.  WITH ECC_DM = 0 AND ECC_DIS = 1
23850 ;          10409 !           DO A READ TRANSFER AND CHECK ECH NOT SET
23851 ;          10410 !
23852 ;          10411 ! IMPLICIT INPUTS:
23853 ;          10412 !       IO_BUF
23854 ;          10413 !       A  VECTOR OF 256 WORDS WHERE DATA
23855 ;          10414 !       FOR MBUS READS AND WRITES TRANSFERS
23856 ;          10415 !       IS FOUND.
23857 ;          10416 !
23858 ;          10417 !
23859 ;          10418 !--
23860 ;          10419
23861 ;          10420 local
23862 ;          10421     EXPECTED;                          !EXPECTED ECH_ERR VALUE
23863 ;          10422
23864 ;          10423 CLR_MBUS;                              !CLEAR THE DRIVE
23865 ;          10424 ECC_DM = ONE;                          !SET ECC DIAG MODE
23866 ;          10425 PAR_CRC_WRD = ZEROES;                  !FORCE UNCORRECTABLE ERRORS INTO THE GOOD BLOCK
23867 ;          10426 CRC_A = ZEROES;
23868 ;          10427 CRC_B = ZEROES;
23869 ;          10428 BAI = ONE;
23870 ;          10429 IO_BUF = ONES;
23871 ;          10430 GD_BLK_XFER ();
23872 ;          10431 MLCS1 = write;
23873 ;          10432 TIME_OUT_LOOP;
23874 ;          10433
23875 ;          10434 incr LOOP from 0 to 1 do               !TEST ECH BIT FOR SETTING / NOT SETTING
23876 ;          10435     begin
23877 ;          10436     BGNSUB;                            !START OF SCOPE LOOP
23878 ;          10437     CLR_MBUS;                          !CLEAR THE DRIVE
23879 ;          10438     GD_BLK_XFER ();                    !SET UP A GOOD BLOCK TRANSFER
23880 ;          10439
23881 ;          10440     if .LOOP eql ZERO                  !SELECT THE TEST DATA
23882 ;          10441     then
```

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23884 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
23885 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (108)
23886
23887 ;          10442          begin                         !EXPECT ECH BIT TO SET
23888 ;          10443          ECC_DIS = 0;
23889 ;          10444          EXPECTED = 1;
23890 ;          10445          end
23891 ;          10446      else
23892 ;          10447          begin                         !EXPECT ECH BIT NOT TO SET
23893 ;          10448          ECC_DIS = 1;
23894 ;          10449          EXPECTED = 0;
23895 ;          10450          end;
23896 ;          10451
23897 ;          10452      MLCS1 = read;                     !READ THE ERROR OUT
23898 ;          10453      TIME_OUT_LOOP;
23899 ;          10454
23900 ;          10455      if .ECH_ERR neq .EXPECTED         !IS ECH BIT WHAT WE EXPECTED
23901 ;          10456      then
23902 ;          10457          begin                         !ERROR IF NOT
23903 ;          10458          ERRDF (129, SYNC, DUMPER);
23904 ;          10459          PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_69, WRD_14);
23905 ;          10460          PRINTB (FMT_1, .EXPECTED, .ECH_ERR);
23906 ;          10461          end;
23907 ;          10462
23908 ;          10463      ENDSUB;                           !END OF SCOPE LOOP
23909 ;          10464      end;
23910 ;          10465
23911 ;          10466 ENDTST;
23915
23916                                    .SBTTL  $T58
23920 103476 004167 100356          $T58:  JSR     R1,$SAVE3                ;                    1038
23921 103502 152777 000040 107504          BISB    #40,@ML.REG+40           ;                    1042
23922 103510 016702 110066                 MOV     ML.DUT,R2
23923 103514 042702 177770                 BIC     #177770,R2
23924 103520 142777 000007 107466          BICB    #7,@ML.REG+40
23925 103526 150277 107462                 BISB    R2,@ML.REG+40
23926 103532 152777 000001 107534          BISB    #1,@ML.REG+120           ;                    1042
23927 103540 042777 037400 107556          BIC     #37400,@ML.REG+150       ;                    1042
23928 103546 142777 000077 107550          BICB    #77,@ML.REG+150          ;                    1042
23929 103554 142777 000077 107552          BICB    #77,@ML.REG+160          ;                    1042
23930 103562 152777 000010 107424          BISB    #10,@ML.REG+40           ;                    1042
23931 103570 012767 177777 106002          MOV     #-1,IO.BUF               ;                    1042
23932 103576 004767 112266                 JSR     PC,GD.BLK.XFER           ;                    1043
23933 103602 012777 000061 107344          MOV     #61,@ML.REG              ;                    1043
23934 103610 105777 107410             1$: TSTB    @ML.REG+50
23935 103614 100375                        BPL     1$
23936 103616 005001                        CLR     R1                       ; LOOP               1043
23937 103620 104402                    2$: TRAP    2                        ;                    1043
23938 103622 152777 000040 107364          BISB    #40,@ML.REG+40           ;                    1043
```

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23940                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
23941                                   ;                                                       14-May-1981 13:05:08    PA:<
23942
23943 103630  016700  107746                    MOV     ML.DUT,R0
23944 103634  042700  177770                    BIC     #177770,R0
23945 103640  142777  000007  107346            BICB    #7,@ML.REG+40
23946 103646  150077  107342                    BISB    R0,@ML.REG+40
23947 103652  004767  112212                    JSR     PC,GD.BLK.XFER                  ;                       1043
23948 103656  005701                            TST     R1                              ; LOOP                  1044
23949 103660  001006                            BNE     3$
23950 103662  142777  000002  107404            BICB    #2,@ML.REG+120                  ;                       1044
23951 103670  012702  000001                    MOV     #1,R2                           ; *,EXPECTED            1044
23952 103674  000404                            BR      4$                              ;                       1044
23953 103676  152777  000002  107370  3$:       BISB    #2,@ML.REG+120                  ;                       1044
23954 103704  005002                            CLR     R2                              ; EXPECTED              1044
23955 103706  012777  000071  107240  4$:       MOV     #71,@ML.REG                     ;                       1045
23956 103714  105777  107304        5$:       TSTB    @ML.REG+50
23957 103720  100375                            BPL     5$
23958 103722  010203                            MOV     R2,R3                           ; EXPECTED,*            1045
23959 103724  005000                            CLR     R0
23960 103726  132777  000100  107300            BITB    #100,@ML.REG+60
23961 103734  001401                            BEQ     6$
23962 103736  005200                            INC     R0
23963 103740  020003                  6$:       CMP     R0,R3
23964 103742  001441                            BEQ     8$
23965 103744  104455                            TRAP    55                              ;                       1045
23966 103746  000201                            .WORD   201
23967 103750  010526                            .WORD   SYNC
23968 103752  024060                            .WORD   DUMPER
23969 103754  012746  006442                    MOV     #WRD.14,-(SP)                   ;                       1045
23970 103760  012746  007252                    MOV     #WRD.69,-(SP)
23971 103764  012746  006406                    MOV     #WRD.10,-(SP)
23972 103770  012746  007240                    MOV     #WRD.67,-(SP)
23973 103774  012746  006046                    MOV     #FOR.FMT,-(SP)
23974 104000  012746  000005                    MOV     #5,-(SP)
23975 104004  010600                            MOV     SP,R0                           ; SP,*
23976 104006  104414                            TRAP    14
23977 104010  005016                            CLR     (SP)                            ;                       1046
23978 104012  132777  000100  107214            BITB    #100,@ML.REG+60
23979 104020  001401                            BEQ     7$
23980 104022  005216                            INC     (SP)
23981 104024  010246                  7$:       MOV     R2,-(SP)                        ; EXPECTED,*
23982 104026  012746  004222                    MOV     #FMT.1,-(SP)
23983 104032  012746  000003                    MOV     #3,-(SP)
23984 104036  010600                            MOV     SP,R0                           ; SP,*
23985 104040  104414                            TRAP    14
23986 104042  062706  000022                    ADD     #22,SP                          ;                       1045
23987 104046  104467                  8$:       TRAP    67                              ;                       1046
23988 104050  006000                            ROR     R0
23989 104052  103662                            BLO     2$
23990 104054  005201                            INC     R1                              ; LOOP                  1043
23991 104056  020127  000001                    CMP     R1,#1                           ; LOOP,*
23992 104062  003656                            BLE     2$
23993 104064  000207                            RTS     PC                              ;                       1038
23994
```

```
23996                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
23997                                   ;                                                       14-May-1981 13:05:08    PA:<
23998
23999                                   ; Routine Size:  124 words
24000                                   ; Maximum stack depth per invocation:  13 words
24005
24006
24010
24011                                           .SBTTL  T58
24015 104066                            T58::
24016 104066  004767  177404            1$:     JSR     PC,$T58                         ;       1046
24017 104072  104466                            TRAP    66
24018 104074  006000                            ROR     R0
24019 104076  103773                            BLO     1$
24020 104100  000207                            RTS     PC
24021
24022                                   ; Routine Size:  6 words
24023                                   ; Maximum stack depth per invocation:  0 words
24028
24029
24030 ;           10467 !<BLF/PAGE>
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14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (109)

```
24032 ;ML4
24033 ;
24034
24035 ;          10468 !
24036 ;          10469 BGNTST;
24037 ;          10470
24038 ;          10471 !++
24039 ;          10472 ! TEST NUMBER:  TST 59
24040 ;          10473 !
24041 ;          10474 ! TEST NAME:            DATA CHECK ERROR BIT TEST
24042 ;          10475 !
24043 ;          10476 ! TEST DESCRIPTION:
24044 ;          10477 !       VIA ECC_EN, ECC_DM AND ECC_DM TEST THE
24045 ;          10478 !       DCK BIT FOR SETTING AND NOT SETTING BY:
24046 ;          10479 !
24047 ;          10480 !       1.  VIA ECC_DM AND A WRITE TRANSFER FORCE
24048 ;          10481 !           ECC ERRORS INTO THE ML11'S GOOD BLOCK
24049 ;          10482 !
24050 ;          10483 !       2.  WITH DCK_EN = 1, ECC_DM = 0, ECC_DIS = 0
24051 ;          10484 !           DO A READ TRANSFER AND CHECK THE DCK BIT SET
24052 ;          10485 !
24053 ;          10486 !       3.  WITH DCK_EN = 0, ECC_DM = 0, ECC_DIS = 0
24054 ;          10487 !           DO A READ TRANSFER AND CHECK THE DCK BIT NOT SET
24055 ;          10488 !
24056 ;          10489 !       4.  WITH ECK_EN = 1, ECC_DM = 0, ECC_DIS = 1
24057 ;          10490 !           DO A READ TRANSFER AND CHECK THE DCK BIT SET
24058 ;          10491 !
24059 ;          10492 !
24060 ;          10493 ! IMPLICIT INPUTS:
24061 ;          10494 !       IO_BUF
24062 ;          10495 !       A VECTOR OF 256 WORDS WHERE DATA
24063 ;          10496 !       FOR MBUS READS AND WRITES TRANSFERS
24064 ;          10497 !       IS FOUND.
24065 ;          10498 !
24066 ;          10499 !
24067 ;          10500 !--
24068 ;          10501
24069 ;          10502 local
24070 ;          10503     SGL,                          !SINGLE BIT ERROR PARRAMETER
24071 ;          10504     UNC,                          !UNCORRECTABLE ERROR PARRAMETER
24072 ;          10505     EXPECTED;                     !EXPECTED DATA CHECK BIT VALUE
24073 ;          10506
24074 ;          10507 CLR_MBUS;                         !CLEAR THE DRIVE
24075 ;          10508 FOR_ECC_ERR (SGL = 1, UNC = 0);   !FORCE  A SBE
24076 ;          10509 BAI = ONE;
24077 ;          10510 IO_BUF = ZEROES;
24078 ;          10511 GD_BLK_XFER ();                   !SET UP A GOOD BLOCK TRANSFER
24079 ;          10512 MLCS1 = write;                    !WRITE THE DRIVE WITH THE ERROR
24080 ;          10513 TIME_OUT_LOOP;
24081 ;          10514
24082 ;          10515 incr LOOP from 0 to 2 do          !TEST DCK BIT FOR 3 CONDITIONS
24083 ;          10516     begin
24084 ;          10517     BGNSUB;                       !START OF SCOPE LOOP
24085 ;          10518     CLR_MBUS;                     !CLEAR THE DRIVE
24086 ;          10519     GD_BLK_XFER ();               !SET UP A GOOD BLOCK TRANSFER
```

```
24088 ;ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
24089 ;                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (109)
24090 ;
24091 ;         10520
24092 ;         10521     case .LOOP from 0 to 2 of                   !SELECT THE TEST DATA
24093 ;         10522          set
24094 ;         10523
24095 ;         10524          [0] :                                  !EXPECT THE DCK BIT TO SET
24096 ;         10525               begin
24097 ;         10526               DCK_EN = 1;
24098 ;         10527               ECC_DIS = 0;
24099 ;         10528               EXPECTED = 1;
24100 ;         10529               end;
24101 ;         10530
24102 ;         10531          [1] :                                  !EXPECT THE DCK BIT NOT TO SET
24103 ;         10532               begin
24104 ;         10533               DCK_EN = 0;
24105 ;         10534               ECC_DIS = 0;
24106 ;         10535               EXPECTED = 0;
24107 ;         10536               end;
24108 ;         10537
24109 ;         10538          [2] :                                  !EXPECT THE DCK BIT TO SET
24110 ;         10539               begin
24111 ;         10540               DCK_EN = 1;
24112 ;         10541               ECC_DIS = 1;
24113 ;         10542               EXPECTED = 1;
24114 ;         10543               end;
24115 ;         10544          tes;
24116 ;         10545
24117 ;         10546     MLCS1 = read;                               !READ THE ERROR AND CLOCK THE DCK BIT
24118 ;         10547     TIME_OUT_LOOP;
24119 ;         10548
24120 ;         10549     if .DCK neq .EXPECTED                       !IS THE DCK BIT WHAT WE EXPECTED
24121 ;         10550     then
24122 ;         10551          begin                                  !REPORT THE ERRRO IF NOT THE SAME
24123 ;         10552
24124 ;         10553          if .LOOP neq ONE then ERRDF (130, SYNC, DUMPER) else ERRDF (130, ASYNC, DUMPER);
24125 ;         10554
24126 ;         10555                                                 !CHOOSE WHICH THE ERROR IS ON
24127 ;         10556          PRINTB (THR_FMT, WRD_72, PHR_5, WRD_10);
24128 ;         10557          PRINTB (FMT_1, .EXPECTED, .DCK);
24129 ;         10558          end;
24130 ;         10559
24131 ;         10560     ENDSUB;                                     !END OF THE SCOPE LOOP
24132 ;         10561     end;
24133 ;         10562
24134 ;         10563 ENDTST;
24138
24139                                   .SBTTL  $T59
```

```
24144                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
24145                                   ;                                                       14-May-1981 13:05:08    PA:<
24146
24147 104102  004167  077752            $T59:   JSR     R1,$SAVE3               ;                                       1046
24148 104106  152777  000040  107100            BISB    #40,@ML.REG+40          ;                                       1050
24149 104114  016702  107462                    MOV     ML.DUT,R2
24150 104120  042702  177770                    BIC     #177770,R2
24151 104124  142777  000007  107062            BICB    #7,@ML.REG+40
24152 104132  150277  107056                    BISB    R2,@ML.REG+40
24153 104136  012701  000001                    MOV     #1,R1                   ; *,SGL                                 1050
24154 104142  010146                            MOV     R1,-(SP)                ; SGL,*
24155 104144  005001                            CLR     R1                      ; UNC
24156 104146  005046                            CLR     -(SP)
24157 104150  004767  111604                    JSR     PC,FOR.ECC.ERR
24158 104154  152777  000010  107032            BISB    #10,@ML.REG+40          ;                                       1050
24159 104162  005067  105412                    CLR     IO.BUF                  ;                                       1051
24160 104166  004767  111676                    JSR     PC,GD.BLK.XFER          ;                                       1051
24161 104172  012777  000061  106754            MOV     #61,@ML.REG             ;                                       1051
24162 104200  105777  107020            1$:     TSTB    @ML.REG+50
24163 104204  100375                            BPL     1$
24164 104206  005001                            CLR     R1                      ; LOOP                                  1051
24165 104210  104402            2$:     TRAP    2                               ;                                       1051
24166 104212  152777  000040  106774            BISB    #40,@ML.REG+40          ;                                       1051
24167 104220  016700  107356                    MOV     ML.DUT,R0
24168 104224  042700  177770                    BIC     #177770,R0
24169 104230  142777  000007  106756            BICB    #7,@ML.REG+40
24170 104236  150077  106752                    BISB    R0,@ML.REG+40
24171 104242  004767  111622                    JSR     PC,GD.BLK.XFER          ;                                       1051
24172 104246  010100                            MOV     R1,R0                   ; LOOP,*                                1052
24173 104250  006300                            ASL     R0
24174 104252  066007  104256                    ADD     3$(R0),PC
24175 104256  000006            3$:     .WORD   4$-3$
24176 104260  000024                    .WORD   5$-3$
24177 104262  000044                    .WORD   6$-3$
24178 104264  152777  000004  107002    4$:     BISB    #4,@ML.REG+120          ;                                       1052
24179 104272  142777  000002  106774            BICB    #2,@ML.REG+120          ;                                       1052
24180 104300  000416                            BR      7$                      ;                                       1052
24181 104302  142777  000004  106764    5$:     BICB    #4,@ML.REG+120          ;                                       1053
24182 104310  142777  000002  106756            BICB    #2,@ML.REG+120          ;                                       1053
24183 104316  005002                            CLR     R2                      ; EXPECTED                              1053
24184 104320  000410                            BR      8$                      ;                                       1052
24185 104322  152777  000004  106744    6$:     BISB    #4,@ML.REG+120          ;                                       1054
24186 104330  152777  000002  106736            BISB    #2,@ML.REG+120          ;                                       1054
24187 104336  012702  000001            7$:     MOV     #1,R2                   ; *,EXPECTED                            1054
24188 104342  012777  000071  106604    8$:     MOV     #71,@ML.REG             ;                                       1054
24189 104350  105777  106650            9$:     TSTB    @ML.REG+50
24190 104354  100375                            BPL     9$
24191 104356  010203                            MOV     R2,R3                   ; EXPECTED,*                            1054
24192 104360  005000                            CLR     R0
24193 104362  005777  106646                    TST     @ML.REG+60
24194 104366  100001                            BPL     10$
24195 104370  005200                            INC     R0
24196 104372  020003            10$:    CMP     R0,R3
24197 104374  001446                            BEQ     14$
24198 104376  020127  000001                    CMP     R1,#1                   ; LOOP,*                                1055
```

```
24200                           ;ML4                                                    14-May-1981 13:48:54    TOPS
24201                           ;                                                       14-May-1981 13:05:08    PA:<
24202
24203 104402  001405                    BEQ     11$
24204 104404  104455                    TRAP    55
24205 104406  000202                    .WORD   202
24206 104410  010526                    .WORD   SYNC
24207 104412  024060                    .WORD   DUMPER
24208 104414  000404                    BR      12$
24209 104416  104455            11$:    TRAP    55
24210 104420  000202                    .WORD   202
24211 104422  010464                    .WORD   ASYNC
24212 104424  024060                    .WORD   DUMPER
24213 104426  012746  006406    12$:    MOV     #WRD.10,-(SP)                   ;       1055
24214 104432  012746  007472            MOV     #PHR.5,-(SP)
24215 104436  012746  007302            MOV     #WRD.72,-(SP)
24216 104442  012746  006034            MOV     #THR.FMT,-(SP)
24217 104446  012746  000004            MOV     #4,-(SP)
24218 104452  010600                    MOV     SP,R0                           ; SP,*
24219 104454  104414                    TRAP    14
24220 104456  005016                    CLR     (SP)                            ;       1055
24221 104460  005777  106550            TST     @ML.REG+60
24222 104464  100001                    BPL     13$
24223 104466  005216                    INC     (SP)
24224 104470  010246            13$:    MOV     R2,-(SP)                        ; EXPECTED,*
24225 104472  012746  004222            MOV     #FMT.1,-(SP)
24226 104476  012746  000003            MOV     #3,-(SP)
24227 104502  010600                    MOV     SP,R0                           ; SP,*
24228 104504  104414                    TRAP    14
24229 104506  062706  000020            ADD     #20,SP                          ;       1055
24230 104512  104467            14$:    TRAP    67                              ;       1055
24231 104514  006000                    ROR     R0
24232 104516  103634                    BLO     2$
24233 104520  005201                    INC     R1                              ; LOOP          1051
24234 104522  020127  000002            CMP     R1,#2                           ; LOOP,*
24235 104526  003630                    BLE     2$
24236 104530  022626                    CMP     (SP)+,(SP)+                     ;       1046
24237 104532  000207                    RTS     PC
24238
24239                           ; Routine Size:  141 words
24240                           ; Maximum stack depth per invocation:  14 words
24245
24246
24250
24251                                   .SBTTL  T59
```

```
24256                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
24257                                   ;                                                       14-May-1981 13:05:08    PA:<
24258
24259 104534                            T59::
24260 104534  004767  177342            1$:     JSR     PC,$T59                 ;                                       1056
24261 104540  104466                            TRAP    66
24262 104542  006000                            ROR     R0
24263 104544  103773                            BLO     1$
24264 104546  000207                            RTS     PC
24265
24266                                   ; Routine Size:  6 words
24267                                   ; Maximum stack depth per invocation:  0 words
24272
24273
24274 ;         10564 !<BLF/PAGE>
```

14-May-1981 13:48:54 TOPS-20 Bliss-16 V2(212)
14-May-1981 13:05:08 PA:<NEALE>ML4.BLI.7 (110)

```
24276 ;ML4
24277 ;
24278
24279 ;          10565 !
24280 ;          10566 BGNTST;
24281 ;          10567
24282 ;          10568 !++
24283 ;          10569 ! TEST NUMBER:  TST 60
24284 ;          10570 !
24285 ;          10571 ! TEST NAME:    PROM DATA TEST
24286 ;          10572 !
24287 ;          10573 ! TEST DESCRIPTION:
24288 ;          10574 !
24289 ;          10575 !       VERIFY THAT CHECK SUM VALUES FOR
24290 ;          10576 !       ALL PRESENT MEMORY ARRAY UV PROM
24291 ;          10577 !       LOCATIONS ARE ERROR FREE BY:
24292 ;          10578 !
24293 ;          10579 !       1.  DOING MBUS TRANSFERS
24294 ;          10580 !           AT ALL PRESENT BLOCKS
24295 ;          10581 !           AND TESTING THE UNS BIT
24296 ;          10582 !           TO BE CLEARED.
24297 ;          10583 !
24298 ;          10584 ! IMPLICIT INPUTS:
24299 ;          10585 !
24300 ;          10586 !       IO_BUF
24301 ;          10587 !
24302 ;          10588 !       A VECTOR OF 256 WORDS WHERE
24303 ;          10589 !       DATA FOR MBUS READ AND WRITE
24304 ;          10590 !       FUNCTIONS IS FOUND.
24305 ;          10591 !
24306 ;          10592 !
24307 ;          10593 !       CHIP_SIZ
24308 ;          10594 !       INDICATED THE SIZE OF THE
24309 ;          10595 !       ARRAY MODULES MOS RAMS.
24310 ;          10596 !
24311 ;          10597 !
24312 ;          10598 !--
24313 ;          10599
24314 ;          10600 incr DSA_CNT from 0 to .LST_BLK do          !WRITE TO ALL PRESENT BLK'S AND CHECK UNS BIT
24315 ;          10601     begin
24316 ;          10602     BGNSUB;
24317 ;          10603     CLR_MBUS;
24318 ;          10604     ECC_DIS = ONE;                         !DISABLE ECC
24319 ;          10605     MLWC = not 255;                        !LOAD WORD COUNT
24320 ;          10606     MLBA = IO_BUF;                         !LOAD UBUS ADRS
24321 ;          10607     MLDA = .DSA_CNT;                       !LOAD DSA
24322 ;          10608     MLCS1 = write;                         !DO A WRITE FUNCTION
24323 ;          10609     TIME_OUT_LOOP;
24324 ;          10610
24325 ;          10611     if .UNS IS_SET                         !SEE IF XFERR CAUSED AN UNS ERROR
24326 ;          10612     then
24327 ;          10613         begin                              !ERROR IF SET
24328 ;          10614         ERRDF (107, ARR_DAT, DUMPER);
24329 ;          10615         PRINTB (TWO_FMT, WRD_35, PHR_4);
24330 ;          10616         PRINTB (FMT_9, .DSA_CNT);
```

```
24332 :ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
24333 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (110)
24334
24335 ;          10617
24336 ;          10618          if .CHIP_SIZ eql 64                    !NEED TO KNOW CHIP SIZE TO PRINT ARRAY NUMBER
24337 ;          10619          then
24338 ;          10620              begin
24339 ;          10621              PRINTB (FMT_8, ((.DSA_CNT<11, 4>) + 1));    !64K MOS RAM
24340 ;          10622              end
24341 ;          10623          else
24342 ;          10624              begin
24343 ;          10625              PRINTB (FMT_8, ((.DSA_CNT<9, 4>) + 1));     !16K MOS RAM
24344 ;          10626              end
24345 ;          10627
24346 ;          10628          end;
24347 ;          10629
24348 ;          10630      ENDSUB;
24349 ;          10631      end;
24350 ;          10632
24351 ;          10633 ENDTST;
24355
24356                                      .SBTTL  $T60
24360 104550  004167  077270       $T60:  JSR     R1,$SAVE2                ;                          1056
24361 104554  016702  105012              MOV     LST.BLK,R2               ;                          1060
24362 104560  005001                      CLR     R1                       ; DSA.CNT
24363 104562  000536                      BR      6$
24364 104564  104402              1$:     TRAP    2                        ;                          1060
24365 104566  152777  000040  106420      BISB    #40,@ML.REG+40           ;                          1060
24366 104574  016700  107002              MOV     ML.DUT,R0
24367 104600  042700  177770              BIC     #177770,R0
24368 104604  142777  000007  106402      BICB    #7,@ML.REG+40
24369 104612  150077  106376              BISB    R0,@ML.REG+40
24370 104616  152777  000002  106450      BISB    #2,@ML.REG+120           ;                          1060
24371 104624  012777  177400  106332      MOV     #-400,@ML.REG+10         ;                          1060
24372 104632  012777  011600  106334      MOV     #IO.BUF,@ML.REG+20       ;                          1060
24373 104640  010177  106340              MOV     R1,@ML.REG+30            ; DSA.CNT,*                1060
24374 104644  012777  000061  106302      MOV     #61,@ML.REG              ;                          1060
24375 104652  105777  106346        2$:   TSTB    @ML.REG+50
24376 104656  100375                      BPL     2$
24377 104660  032777  040000  106346      BIT     #40000,@ML.REG+60        ;                          1061
24378 104666  001470                      BEQ     5$
24379 104670  104455                      TRAP    55                       ;                          1061
24380 104672  000153                      .WORD   153
24381 104674  010570                      .WORD   ARR.DAT
24382 104676  024060                      .WORD   DUMPER
24383 104700  012746  007454              MOV     #PHR.4,-(SP)             ;                          1061
24384 104704  012746  006666              MOV     #WRD.35,-(SP)
24385 104710  012746  006024              MOV     #TWO.FMT,-(SP)
24386 104714  012746  000003              MOV     #3,-(SP)
```

```
                                                                                    14-May-1981 13:48:54    TOPS
                                                                                    14-May-1981 13:05:08    PA:<
24388                                ;ML4
24389                                ;
24390
24391 104720 010600                  MOV     SP,R0                          ; SP,*
24392 104722 104414                  TRAP    14
24393 104724 010116                  MOV     R1,(SP)                        ; DSA.CNT,*                    1061
24394 104726 012746 004644           MOV     #FMT.9,-(SP)
24395 104732 012746 000002           MOV     #2,-(SP)
24396 104736 010600                  MOV     SP,R0                          ; SP,*
24397 104740 104414                  TRAP    14
24398 104742 026727 104622 000100    CMP     CHIP.SIZ,#100                  ;                              1061
24399 104750 001020                  BNE     3$
24400 104752 010100                  MOV     R1,R0                          ; DSA.CNT,*                    1062
24401 104754 006200                  ASR     R0
24402 104756 006200                  ASR     R0
24403 104760 006200                  ASR     R0
24404 104762 000300                  SWAB    R0
24405 104764 042700 177760           BIC     #177760,R0
24406 104770 010046                  MOV     R0,-(SP)
24407 104772 005216                  INC     (SP)
24408 104774 012746 004610           MOV     #FMT.8,-(SP)
24409 105000 012746 000002           MOV     #2,-(SP)
24410 105004 010600                  MOV     SP,R0                          ; SP,*
24411 105006 104414                  TRAP    14
24412 105010 000415                  BR      4$                             ;                              1061
24413 105012 010100                3$:   MOV     R1,R0                          ; DSA.CNT,*                    1062
24414 105014 006200                  ASR     R0
24415 105016 000300                  SWAB    R0
24416 105020 042700 177760           BIC     #177760,R0
24417 105024 010046                  MOV     R0,-(SP)
24418 105026 005216                  INC     (SP)
24419 105030 012746 004610           MOV     #FMT.8,-(SP)
24420 105034 012746 000002           MOV     #2,-(SP)
24421 105040 010600                  MOV     SP,R0                          ; SP,*
24422 105042 104414                  TRAP    14
24423 105044 062706 000022         4$:   ADD     #22,SP                         ;                              1061
24424 105050 104467                5$:   TRAP    67                             ;                              1062
24425 105052 006000                  ROR     R0
24426 105054 103643                  BLO     1$
24427 105056 005201                  INC     R1                             ; DSA.CNT                      1060
24428 105060 020102                6$:   CMP     R1,R2                          ; DSA.CNT,*
24429 105062 003640                  BLE     1$
24430 105064 000207                  RTS     PC                             ;                              1056
24431
24432                                ; Routine Size:  103 words
24433                                ; Maximum stack depth per invocation:  12 words
24438
24439
```

```
24444                                   ;ML4                                                    14-May-1981 13:48:54    TOPS
24445                                   ;                                                       14-May-1981 13:05:08    PA:<
24446
24447
24448                                           .SBTTL  T60
24452 105066                            T60::
24453 105066  004767  177456            1$:     JSR     PC,$T60                 ;                                       1063
24454 105072  104466                            TRAP    66
24455 105074  006000                            ROR     R0
24456 105076  103773                            BLO     1$
24457 105100  000207                            RTS     PC
24458
24459                                   ; Routine Size:  6 words
24460                                   ; Maximum stack depth per invocation:  0 words
24465
24466
24467 ;          10634 !<BLF/PAGE>
```

```
24469 :ML4                                                    14-May-1981 13:48:54    TOPS-20 Bliss-16 V2(212)
24470 :                                                       14-May-1981 13:05:08    PA:<NEALE>ML4.BLI.7 (111)
24471
24472 ;          10635 !       THE CLEANUP CODING SECTION IS EXECUTED AFTER THE
24473 ;          10636 !       HARDWARE TESTS ARE RUN ON A LOGICAL UNIT.
24474 ;          10637 BGNCLN;
24475 ;          10638 CLR = ONE;                                !CLEAR THE MASS BUS
24476 ;          10639 return;
24477 ;          10640 ENDCLN;
24481
24482                                        .SBTTL  LCLEAN
24486 105102  152777  000040  106104  LCLEAN: BISB    #40,@ML.REG+40                  ;                1063
24487 105110  000207                          RTS     PC                              ;                1063
24488
24489                                  ; Routine Size:  4 words
24490                                  ; Maximum stack depth per invocation:  0 words
24495
24496
24500
24501                                        .SBTTL  L$CLEAN
24505 105112                           L$CLEAN::
24506 105112  004767  177764                  JSR     PC,LCLEAN                       ;                1063
24507 105116  104412                          TRAP    12
24508 105120  000207                          RTS     PC
24509
24510                                  ; Routine Size:  4 words
24511                                  ; Maximum stack depth per invocation:  0 words
24516
24517
24518 ;          10641 LASTAD;
24519 ;          10642 BGNSETUP (0);
24520 ;          10643 ENDSETUP;
```

```
                                ;ML4                                                    14-May-1981 13:48:54    TOPS
                                ;                                                       14-May-1981 13:05:08    PA:<
105122  105126                BL$LAS::.WORD   T$FREE
105124  000000                        .WORD   <<T$FREE-<BL$LAS+4>>/2>
105126  000000                T$FREE::.WORD   0

        105126                L$LAST==            BL$LAS+4
        000000                T$PTHV==            0

                                .SBTTL  $END.LINK
105130                        $END.LINK::
105130  000207                        RTS     PC                                      ;                               1064

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words

;           10644 end
;           10645
;           10646 eludom

                                ; OTS external references
                                        .GLOBL  BL$GT2, $SAVE5, $SAVE4, $SAVE3
                                        .GLOBL  $SAVE2, BL$PU2, BL$PU1, BL$GT1
                                        .GLOBL  BL$DIV, BL$MOD, BL$MUL

                                ; Size:           14699 code + 1916 data words
                                ; Run Time:      03:15.0
                                ; Elapsed Time: 09:39.2
                                ; Memory Used:  118 pages
                                ; Compilation Complete

000001                                  .END
```

```
ADR   = 000020 G    C$CLP1= 000006    EF.RES= 000037 G    FNC.3 = 007750    IER   = 020000 G
ARR.DA= 010570      C$CVEC= 000036    EF.STA= 000040 G    FNC.4 = 007756    INTER = 010672
ARR.IN  011562      C$DCLN= 000044    EIG.FM= 006142      FNC.5 = 007774    IO.BUF  011600
ARR.16  011574      C$DODU= 000051    ELV.FM= 006244      FNC.6 = 010004    ISR   = 000100 G
ASSEMB= 000010      C$DRPT= 000024    ERRBLK  002160 G    FNC.7 = 010012    IXE   = 004000 G
ASYNC = 010464      C$DU  = 000053    ERRMSG  002156 G    FNC.8 = 010022    I$AU  = 000041
A.CAL   013140      C$EDIT= 000003    ERRNBR  002154 G    FNC.9 = 010036    I$AUTO= 000041
A.GEN   013146      C$ERDF= 000055    ERRTYP  002152 G    FORCE.  015602    I$CLN = 000041
BIT0  = 000001 G    C$ERHR= 000056    ERR.CH  015212      FOR.EC  015760    I$DU  = 000041
BIT00 = 000001 G    C$ERRO= 000060    EVL   = 000004 G    FOR.FM= 006046    I$HRD = 000041
BIT01 = 000002 G    C$ERSF= 000054    E$END = 002100      F$AU  = 000015    I$INIT= 000041
BIT02 = 000004 G    C$ERSO= 000057    E$LOAD= 000035      F$AUTO= 000020    I$MOD = 000041
BIT03 = 000010 G    C$ESCA= 000010    E2.TEM= 011156      F$BGN = 000040    I$MSG = 000041
BIT04 = 000020 G    C$ESEG= 000005    FIND.C  015430      F$CLEA= 000007    I$PROT= 000040
BIT05 = 000040 G    C$ESUB= 000003    FIRST.  016040      F$DU  = 000016    I$PTAB= 000041
BIT06 = 000100 G    C$ETST= 000001    FIV.FM= 006062      F$END = 000041    I$PWR = 000041
BIT07 = 000200 G    C$EXIT= 000032    FMT.1 = 004222      F$HARD= 000004    I$RPT = 000041
BIT08 = 000400 G    C$GETB= 000026    FMT.10= 004676      F$HW  = 000013    I$SEG = 000041
BIT09 = 001000 G    C$GETW= 000027    FMT.11= 004750      F$INIT= 000006    I$SETU= 000041
BIT1  = 000002 G    C$GMAN= 000043    FMT.12= 005004      F$JMP = 000050    I$SFT = 000041
BIT10 = 002000 G    C$GPHR= 000042    FMT.13= 005034      F$MOD = 000000    I$SRV = 000041
BIT11 = 004000 G    C$GPLO= 000030    FMT.14= 005110      F$MSG = 000011    I$SUB = 000041
BIT12 = 010000 G    C$GPRI= 000040    FMT.15= 005150      F$PROT= 000021    I$TST = 000041
BIT13 = 020000 G    C$INIT= 000011    FMT.16= 005216      F$PWR = 000017    J$JMP = 000167
BIT14 = 040000 G    C$INLP= 000020    FMT.17= 005306      F$RPT = 000012    LAST.B  016122
BIT15 = 100000 G    C$MANI= 000050    FMT.18= 005342      F$SEG = 000003    LAU     004210
BIT2  = 000004 G    C$MEM = 000031    FMT.19= 005412      F$SOFT= 000005    LAUTO   004164
BIT3  = 000010 G    C$MSG = 000023    FMT.2 = 004266      F$SRV = 000010    LCLEAN  105102
BIT4  = 000020 G    C$OPEN= 000034    FMT.20= 005462      F$SUB = 000002    LDU     004176
BIT5  = 000040 G    C$PNTB= 000014    FMT.21= 005534      F$SW  = 000014    LD.LNG  017132
BIT6  = 000100 G    C$PNTF= 000017    FMT.22= 005606      F$TEST= 000001    LINIT   024722
BIT7  = 000200 G    C$PNTS= 000016    FMT.23= 005652      GD.BLK  016070    LOAD.S  013604
BIT8  = 000400 G    C$PNTX= 000015    FMT.24= 005722      GOOD.B  011564    LOE   = 040000 G
BIT9  = 001000 G    C$QIO = 000377    FMT.25= 005746      G$CNTO= 000200    LOT   = 000010 G
BL$DIV  003752 G    C$RDBU= 000007    FMT.26= 005764      G$DELM= 000372    LRPT    004152
BL$GT1  003016 G    C$REFG= 000047    FMT.3 = 004354      G$DISP= 000003    LST.AR  011576
BL$GT2  003140 G    C$RESE= 000033    FMT.4 = 004400      G$EXCP= 000400    LST.BL  011572
BL$LAS  105122 G    C$REVI= 000003    FMT.5 = 004430      G$HILI= 000002    LST.DU  013134
BL$MOD  003764 G    C$RFLA= 000021    FMT.6 = 004532      G$LOLI= 000001    L$ACP   002110 G
BL$MUL  003526 G    C$RPT = 000025    FMT.7 = 004562      G$NO  = 000000    L$APT   002036 G
BL$PU1  003302 G    C$SEFG= 000046    FMT.8 = 004610      G$OFFS= 000400    L$AU    004212 G
BL$PU2  003376 G    C$SPRI= 000041    FMT.9 = 004644      G$OFSI= 000376    L$AUT   002070 G
BL$SHF  003776 G    C$SVEC= 000037    FNC.1 = 007726      G$PRMA= 000001    L$AUTO  004166 G
BOE   = 000400 G    C$TPRI= 000013    FNC.10= 010050      G$PRMD= 000002    L$CCP   002106 G
B.CAL   013142      DATA.L= 010732    FNC.11= 010060      G$PRML= 000000    L$CLEA  105112 G
B.GEN   013150      DAT.DM  014162    FNC.12= 010100      G$RADA= 000140    L$CO    002032 G
CAL.CR  014612      DFPTBL  002356 G  FNC.13= 010112      G$RADB= 000000    L$DEPO  002011 G
CHIP.S  011570      DIAGMC= 000000    FNC.14= 010122      G$RADD= 000040    L$DESC  002130 G
C$AU  = 000052      DIVMOD  003570    FNC.15= 010136      G$RADL= 000120    L$DESP  002076 G
C$AUTO= 000061      DRIVE.  013132    FNC.16= 010150      G$RADO= 000020    L$DEVP  002060 G
C$BRK = 000022      DT.1    013534    FNC.17= 010162      G$XFER= 000004    L$DISP  002164 G
C$BSEG= 000004      DUMPER  024060 G  FNC.18= 010172      G$YES = 000010    L$DLY   002116 G
C$BSUB= 000002      D1.TEM= 011152    FNC.19= 010204      HELP  = 000000    L$DTP   002040 G
C$CEFG= 000045      D2.TEM= 011154    FNC.2 = 007742      HOE   = 100000 G  L$DTYP  002034 G
C$CLCK= 000062      EF.CON= 000036 G  FNC.21= 010216      HW.OR.  011160    L$DU    004200 G
C$CLEA= 000012      EF.NEW= 000035 G  FNC.22= 010230      IBE   = 010000 G  L$DUT   002072 G
C$CLOS= 000035      EF.PWR= 000034 G  FNC.23= 010242      IDU   = 000040 G  L$DVTY  002122 G
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L$EF    002052 G    O$APTS= 000001      P.AAT   005462    P.ACY   006732    P.AFD   010012
L$ENVI  002044 G    O$AU  = 000001      P.AAU   005534    P.ACZ   006746    P.AFE   010022
L$ERRT  002152 G    O$BGNR= 000001      P.AAV   005606    P.ADA   006754    P.AFF   010036
L$ETP   002102 G    O$BGNS= 000001      P.AAW   005652    P.ADB   006764    P.AFG   010050
L$EXP1  002046 G    O$DU  = 000001      P.AAX   005722    P.ADC   006772    P.AFH   010060
L$EXP4  002064 G    O$ERRT= 000001      P.AAY   005746    P.ADD   007004    P.AFI   010100
L$EXP5  002066 G    O$GNSW= 000001      P.AAZ   005764    P.ADE   007016    P.AFJ   010112
L$HARD  002402 G    O$POIN= 000001      P.ABA   006016    P.ADF   007026    P.AFK   010122
L$HIME  002120 G    O$SETU= 000001      P.ABB   006024    P.ADG   007036    P.AFL   010136
L$HPCP  002016 G    PAR.DI  011566      P.ABC   006034    P.ADH   007046    P.AFM   010150
L$HPTP  002022 G    PD.TEM  013120      P.ABD   006046    P.ADI   007054    P.AFN   010162
L$HW    002356 G    PHR.1 = 007366      P.ABE   006062    P.ADJ   007066    P.AFO   010172
L$ICP   002104 G    PHR.10= 007564      P.ABF   006100    P.ADK   007074    P.AFP   010204
L$INIT  025666 G    PHR.11= 007576      P.ABG   006120    P.ADL   007104    P.AFQ   010216
L$LADP  002026 G    PHR.12= 007614      P.ABH   006142    P.ADM   007114    P.AFR   010230
L$LAST= 105126 G    PHR.13= 007636      P.ABI   006166    P.ADN   007122    P.AFS   010242
L$LOAD  002100 G    PHR.14= 007662      P.ABJ   006214    P.ADO   007130    P.AFT   010256
L$LUN   002074 G    PHR.15= 007714      P.ABK   006244    P.ADP   007140    P.AFU   010266
L$MREV  002050 G    PHR.2 = 007404      P.ABL   006276    P.ADQ   007152    P.AFV   010274
L$NAME  002000 G    PHR.3 = 007422      P.ABM   006302    P.ADR   007156    P.AFW   010302
L$PRIO  002042 G    PHR.4 = 007454      P.ABN   006314    P.ADS   007174    P.AFX   010310
L$PROT  002750 G    PHR.5 = 007472      P.ABO   006322    P.ADT   007210    P.AFY   010316
L$PRT   002112 G    PHR.6 = 007504      P.ABP   006330    P.ADU   007216    P.AFZ   010324
L$REPP  002062 G    PHR.7 = 007516      P.ABQ   006336    P.ADV   007224    P.AGA   010332
L$REV   002010 G    PHR.8 = 007540      P.ABR   006344    P.ADW   007232    P.AGB   010340
L$RPT   004154 G    PHR.9 = 007552      P.ABS   006360    P.ADX   007240    P.AGC   010346
L$SOFT  002720 G    PNT   = 001000 G    P.ABT   006374    P.ADY   007246    P.AGD   010354
L$SPC   002056 G    PRI   = 002000 G    P.ABU   006406    P.ADZ   007252    P.AGE   010362
L$SPCP  002020 G    PRI00 = 000000 G    P.ABV   006416    P.AEA   007260    P.AGF   010370
L$SPTP  002024 G    PRI01 = 000040 G    P.ABW   006426    P.AEB   007272    P.AGG   010376
L$STA   002030 G    PRI02 = 000100 G    P.ABX   006436    P.AEC   007302    P.AGH   010404
L$SW    002376 G    PRI03 = 000140 G    P.ABY   006442    P.AED   007310    P.AGI   010412
L$TEST  002114 G    PRI04 = 000200 G    P.ABZ   006454    P.AEE   007316    P.AGJ   010420
L$TIML  002014 G    PRI05 = 000240 G    P.ACA   006462    P.AEF   007330    P.AGK   010430
L$UNIT  002012 G    PRI06 = 000300 G    P.ACB   006470    P.AEG   007340    P.AGL   010436
L10000  002374      PRI07 = 000340 G    P.ACC   006502    P.AEH   007346    P.AGM   010444
L10001  002400      PRSN    002376 G    P.ACD   006506    P.AEI   007366    P.AGN   010454
L10002  002476      PTBL.P  011556      P.ACE   006514    P.AEJ   007404    P.AGO   010464
L10003  002726      P.AAA   004222      P.ACF   006522    P.AEK   007422    P.AGP   010526
MEM.AR= 010630      P.AAB   004266      P.ACG   006530    P.AEL   007454    P.AGQ   010570
ML.DUT  013602      P.AAC   004354      P.ACH   006544    P.AEM   007472    P.AGR   010630
ML.LUN  013600      P.AAD   004400      P.ACI   006552    P.AEN   007504    P.AGS   010672
ML.REG  013154      P.AAE   004430      P.ACJ   006560    P.AEO   007516    P.AGT   010732
MSGH1   002476      P.AAF   004532      P.ACK   006574    P.AEP   007540    P.AGU   010772
MSGH2   002512      P.AAG   004562      P.ACL   006602    P.AEQ   007552    P.AGV   011026
MSGH3   002540      P.AAH   004610      P.ACM   006610    P.AER   007564    P.AGW   011060
MSGH4   002563      P.AAI   004644      P.ACN   006624    P.AES   007576    P.AGX   011106
MSGH5   002614      P.AAJ   004676      P.ACO   006632    P.AET   007614    P.CAL   013144
MSGH6   002646      P.AAK   004750      P.ACP   006646    P.AEU   007636    P.GEN   013152
MSGH7   002672      P.AAL   005004      P.ACQ   006654    P.AEV   007662    RAS.IN  013124
MSGS1   002726      P.AAM   005034      P.ACR   006660    P.AEW   007714    RD.CS1  017540
M$DUMP  024070      P.AAN   005110      P.ACS   006666    P.AEX   007726    RD.DA   020074
NIB.SA  011152      P.AAO   005150      P.ACT   006674    P.AEY   007742    RD.DAT  013130
NIN.FM= 006166      P.AAP   005216      P.ACU   006700    P.AEZ   007750    RD.DS   022774
ONEFIL= 000001      P.AAQ   005306      P.ACV   006710    P.AFA   007756    RD.D1   021662
ONE.FM= 006016      P.AAR   005342      P.ACW   006716    P.AFB   007774    RD.D2   022174
OP.NUM  011560      P.AAS   005412      P.ACX   006726    P.AFC   010004    RD.D3   022522
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RD.EE   021536        TST.LN  016154        T33     060514 G      WRD.30= 006624      WRT.D2  022110
RD.EL   021474        TWO.FM= 006024        T34     061450 G      WRD.31= 006632      WRT.D3  022422
RD.ER   017716        T$ARGC= 000002        T35     062102 G      WRD.32= 006646      WRT.EE  021534
RD.E1   020652        T$CODE= 000130        T36     063140 G      WRD.33= 006654      WRT.EL  021472
RD.E2   021072        T$ERRN= 000000        T37     064046 G      WRD.34= 006660      WRT.ER  017646
RD.MR   020252        T$EXCP= 000000        T38     065052 G      WRD.35= 006666      WRT.E1  020566
RD.PA   020444        T$FREE  105126 G      T39     065500 G      WRD.36= 006674      WRT.E2  020774
RD.PD   021334        T$GMAN= 000000        T4      027230 G      WRD.37= 006700      WRT.MR  020202
RD.REG  023470        T$HILI= 000007        T40     066466 G      WRD.38= 006710      WRT.PA  020360
REG.IN  013136        T$LAST= 000000        T41     067520 G      WRD.39= 006716      WRT.PD  021226
REG.1 = 010256        T$LOLI= 000000        T42     070272 G      WRD.4 = 006322      WRT.RE  023102
REG.10= 010346        T$LSYM= 010000        T43     071226 G      WRD.40= 006726      WT.DAT  013126
REG.11= 010354        T$NEST= 177777        T44     071436 G      WRD.41= 006732      W.C.SI  013122
REG.12= 010362        T$NS0 = 000000        T45     071622 G      WRD.42= 006746      XOR.LN  016650
REG.13= 010370        T$NS1 = 000021        T46     072320 G      WRD.43= 006754      X$ALWA= 000000
REG.14= 010376        T$PTHV= 000000 G      T47     072612 G      WRD.44= 006764      X$FALS= 000040
REG.15= 010404        T$PTNU= 000000        T48     073476 G      WRD.45= 006772      X$OFFS= 000400
REG.16= 010412        T$SAVL= 177777        T49     074202 G      WRD.46= 007004      X$TRUE= 000020
REG.17= 010420        T$SEGL= 177777        T5      027652 G      WRD.47= 007016      $END.L  105130 G
REG.18= 010430        T$SUBN= 000000        T50     074620 G      WRD.48= 007026      $PATCH  002756 G
REG.19= 010436        T$TAGL= 177777        T51     075672 G      WRD.49= 007036      $SAVE2  004044 G
REG.2 = 010266        T$TAGN= 010005        T52     076444 G      WRD.5 = 006330      $SAVE3  004060 G
REG.20= 010444        T$TEMP= 000000        T53     077244 G      WRD.50= 007046      $SAVE4  004076 G
REG.21= 010454        T$TEST= 000000        T54     100266 G      WRD.51= 007054      $SAVE5  004116 G
REG.3 = 010274        T$TSTM= 177777        T55     101136 G      WRD.52= 007066      $T1     025676
REG.4 = 010302        T$TSTS= 000000        T56     102240 G      WRD.53= 007074      $T10    032374
REG.5 = 010310        T$$HAR= 010002        T57     103462 G      WRD.54= 007104      $T11    033036
REG.6 = 010316        T$$HW = 010000        T58     104066 G      WRD.55= 007114      $T12    033302
REG.7 = 010324        T$$PRO= 010004        T59     104534 G      WRD.56= 007122      $T13    033702
REG.8 = 010332        T$$SOF= 010003        T6      030310 G      WRD.57= 007130      $T14    035044
REG.9 = 010340        T$$SW = 010001        T60     105066 G      WRD.58= 007140      $T15    036276
REM.TB  013434        T1      026064 G      T7      031140 G      WRD.59= 007152      $T16    037534
RE2     004144        T10     033022 G      T8      032124 G      WRD.6 = 006336      $T17    040424
RE3     004142        T11     033266 G      T9      032360 G      WRD.60= 007156      $T18    041620
RE4     004140        T12     033666 G      UAM   = 000200 G      WRD.61= 007174      $T19    042056
RH.ADD  013572        T13     035030 G      WRD.1 = 006276        WRD.62= 007210      $T2     026100
RH.ERR= 011060        T14     036262 G      WRD.10= 006406        WRD.63= 007216      $T20    043226
RH.TYP  013574        T15     037520 G      WRD.11= 006416        WRD.64= 007224      $T21    044166
RH.VEC  013576        T16     040410 G      WRD.12= 006426        WRD.65= 007232      $T22    044562
SC.SET= 010772        T17     041604 G      WRD.13= 006436        WRD.67= 007240      $T23    045230
SEV.FM= 006120        T18     042042 G      WRD.14= 006442        WRD.68= 007246      $T24    045566
SFPTBL  002376 G      T19     043212 G      WRD.15= 006454        WRD.69= 007252      $T25    046742
SIX.FM= 006100        T2      026330 G      WRD.16= 006462        WRD.7 = 006344      $T26    047534
STACK   012612        T20     044152 G      WRD.17= 006470        WRD.70= 007260      $T27    050660
STK.OF  012600        T21     044546 G      WRD.18= 006502        WRD.71= 007272      $T28    051436
STRIPP  014214        T22     045214 G      WRD.19= 006506        WRD.72= 007302      $T29    052422
SVCGBL= 177777        T23     045552 G      WRD.2 = 006302        WRD.73= 007310      $T3     026344
SVCINS= 177777        T24     046726 G      WRD.20= 006514        WRD.74= 007316      $T30    053534
SVCSUB= 177777        T25     047520 G      WRD.21= 006522        WRD.75= 007330      $T31    054330
SVCTAG= 177777        T26     050644 G      WRD.22= 006530        WRD.76= 007340      $T32    055760
SVCTST= 177777        T27     051422 G      WRD.23= 006544        WRD.77= 007346      $T33    057516
SYNC  = 010526        T28     052406 G      WRD.24= 006552        WRD.8 = 006360      $T34    060530
S$LSYM= 010000        T29     053520 G      WRD.25= 006560        WRD.9 = 006374      $T35    061464
TEN.FM= 006214        T3      026536 G      WRD.26= 006574        WRT.CS  017470      $T36    062116
THR.FM= 006034        T30     054314 G      WRD.27= 006602        WRT.DA  020024      $T37    063154
TIME.O= 011106        T31     055744 G      WRD.29= 006610        WRT.DS  022772      $T38    064062
TRBLE.= 011026        T32     057502 G      WRD.3 = 006314        WRT.D1  021576      $T39    065066
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$T4     026552          $T45    071452          $T50    074216          $T55    100302          $T6     027666
$T40    065514          $T46    071636          $T51    074634          $T56    101152          $T60    104550
$T41    066502          $T47    072334          $T52    075706          $T57    102254          $T7     030324
$T42    067534          $T48    072626          $T53    076460          $T58    103476          $T8     031154
$T43    070306          $T49    073512          $T54    077260          $T59    104102          $T9     032140
$T44    071242          $T5     027244

. ABS.  105132      000
        000000      001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  34715 WORDS  ( 136 PAGES)
DYNAMIC MEMORY:  21558 WORDS  ( 82 PAGES)
ELAPSED TIME:  00:22:27
ML11,ML11/-SP/CR:SYM=SVC/ML,CZMLAC.DOC,ML2.P11,B16PG1.P11,B16PG2.P11,B16PG3.P11,B16PG4.P11,B16MUL.P11,B16SAV.P11,ML3.P11,ML4.P11
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ML11 CREATED BY MACRO ON 18-MAY-81 AT 08:24 PAGE 1
SYMBOL CROSS REFERENCE CREF SEQ 0498

SYMBOL	VALUE		REFERENCES
ADR	= 000020	G	#91-2189
ARR.DA	= 010570		#95-2389 196-8115 199-8364 205-8663 213-9050 249-11475 249-11538 249-11613 280-13453 286-13725 292-14080 293-14101 293-14122 294-14143 294-14160 305-14767 348-17722 354-18046 373-19296 445-24381
ARR.IN	011562		#86-1880 *184-7232 *184-7252 263-12425 263-12466 264-12472 303-14653 307-15172 307-15181 325-16206 326-16224 328-16371 329-16389 370-18904 370-18908
ARR.16	011574		#86-1887 *184-7222 *184-7233 *184-7253 *184-7254 263-12467
ASSEMB	= 000010		5-13 5-13
ASYNC	= 010464		#95-2387 190-7689 194-7904 196-8097 199-8346 205-8643 206-8705 212-9037 219-9386 220-9410 220-9430 223-9581 226-9758 227-9779 227-9795 231-10006 231-10021 232-10042 232-10059 232-10075 233-10113 233-10132 234-10160 238-10379 239-10398 239-10415 239-10432 239-10448 240-10486 240-10505 241-10533 243-10775 243-10793 243-10810 243-10827 243-10846 243-10880 243-10902 243-10926 246-11140 246-11156 246-11175 247-11196 247-11213 247-11230 251-11791 255-12025 256-12046 256-12064 257-12100 257-12133 258-12179 262-12374 262-12390 262-12407 263-12440 264-12486 266-12620 266-12636 266-12652 266-12671 268-12831 269-12854 269-12875 273-13058 299-14447 311-15457 320-15918 330-16473 371-18978 381-19817 382-19841 383-19884 383-19907 383-19923 386-20070 425-23219 431-23660 442-24211
A.CAL	013140		#86-1904 100-2890 *100-2891 *100-2892 102-3014 *405-21097 406-21127 *408-21340 408-21369
A.GEN	013146		#86-1907 102-2990 102-3014 *405-21094 406-21120 *408-21337 408-21359
BIT0	= 000001	G	#91-2173
BIT00	= 000001	G	#91-2163
BIT01	= 000002	G	#91-2162
BIT02	= 000004	G	#91-2161
BIT03	= 000010	G	#91-2160
BIT04	= 000020	G	#91-2159
BIT05	= 000040	G	#91-2158
BIT06	= 000100	G	#91-2157
BIT07	= 000200	G	#91-2156
BIT08	= 000400	G	#91-2155
BIT09	= 001000	G	#91-2154
BIT1	= 000002	G	#91-2172
BIT10	= 002000	G	#91-2153
BIT11	= 004000	G	#91-2152
BIT12	= 010000	G	#91-2151
BIT13	= 020000	G	#91-2150
BIT14	= 040000	G	#91-2149
BIT15	= 100000	G	#91-2148
BIT2	= 000004	G	#91-2171
BIT3	= 000010	G	#91-2170
BIT4	= 000020	G	#91-2169
BIT5	= 000040	G	#91-2168
BIT6	= 000100	G	#91-2167
BIT7	= 000200	G	#91-2166
BIT8	= 000400	G	#91-2165
BIT9	= 001000	G	#91-2164
BL$DIV	003752	G	#38-274 103-3086 418-22541 421-22855 449-24564
BL$GT1	003016	G	#10-143 354-18038 449-24563
BL$GT2	003140	G	#16-153 99-2708 100-2862 104-3112 255-12019 257-12094 258-12173 278-13340 280-13423 292-14034 305-14739 307-15131 311-15430 317-15774 319-15891 326-16249 329-16413 332-16767 337-17113 347-17696 348-17709 373-19283 400-20845 418-22565 422-22905 449-24562
BL$LAS	105122	G	#449-24530 449-24531 449-24535
BL$MOD	003764	G	#39-304 104-3094 418-22580 421-22859 449-24564

SYMBOL		VALUE		REFERENCES								
BL$MUL		003526	G	#35-128	425-23136	449-24564						
BL$PU1		003302	G	#22-140	405-21082	449-24563						
BL$PU2		003376	G	#29-183	102-2989	102-2998	102-3007	257-12127	348-17743	418-22596	422-22876	449-24563
BL$SHF		003776	G	10-155	10-158	10-162	10-166	11-191	17-175	17-178	17-182	17-186
				17-207	22-143	22-147	22-153	23-180	29-192	29-196	29-202	30-234
				#40-338								
BOE	=	000400	G	#91-2193								
B.CAL		013142		#86-1905	100-2896	*100-2897	*100-2898	102-3016	*405-21098	406-21128	*408-21341	408-21370
B.GEN		013150		#86-1908	102-2999	102-3016	*405-21095	406-21121	*408-21338	408-21360		
CAL.CR		014612		#100-2832	405-21100	408-21343						
CHIP.S		011570		#86-1884	*184-7231	*184-7251	446-24398					
C$AU	=	000052		#5-13								
C$AUTO	=	000061		#5-13								
C$BRK	=	000022		#5-13								
C$BSEG	=	000004		#5-13								
C$BSUB	=	000002		#5-13								
C$CEFG	=	000045		#5-13								
C$CLCK	=	000062		#5-13								
C$CLEA	=	000012		#5-13								
C$CLOS	=	000035		#5-13								
C$CLP1	=	000006		#5-13								
C$CVEC	=	000036		#5-13								
C$DCLN	=	000044		#5-13								
C$DODU	=	000051		#5-13								
C$DRPT	=	000024		#5-13								
C$DU	=	000053		#5-13								
C$EDIT	=	000003		#5-13	5-65							
C$ERDF	=	000055		#5-13								
C$ERHR	=	000056		#5-13								
C$ERRO	=	000060		#5-13								
C$ERSF	=	000054		#5-13								
C$ERSO	=	000057		#5-13								
C$ESCA	=	000010		#5-13								
C$ESEG	=	000005		#5-13								
C$ESUB	=	000003		#5-13								
C$ETST	=	000001		#5-13								
C$EXIT	=	000032		#5-13								
C$GETB	=	000026		#5-13								
C$GETW	=	000027		#5-13								
C$GMAN	=	000043		#5-13								
C$GPHR	=	000042		#5-13								
C$GPLO	=	000030		#5-13								
C$GPRI	=	000040		#5-13								
C$INIT	=	000011		#5-13								
C$INLP	=	000020		#5-13								
C$MANI	=	000050		#5-13								
C$MEM	=	000031		#5-13								
C$MSG	=	000023		#5-13								
C$OPEN	=	000034		#5-13								
C$PNTB	=	000014		#5-13								
C$PNTF	=	000017		#5-13								
C$PNTS	=	000016		#5-13								

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SYMBOL  VALUE           REFERENCES
C$PNTX  = 000015        #5-13
C$QIO   = 000377        #5-13
C$RDBU  = 000007        #5-13
C$REFG  = 000047        #5-13
C$RESE  = 000033        #5-13       #5-13
C$REVI  = 000003        #5-13        5-65
C$RFLA  = 000021        #5-13
C$RPT   = 000025        #5-13
C$SEFG  = 000046        #5-13
C$SPRI  = 000041        #5-13
C$SVEC  = 000037        #5-13
C$TPRI  = 000013        #5-13
DATA.L  = 010732        #95-2392
DAT.DM    014162        #98-2558    99-2665    292-14061  310-15368  310-15389  332-16688  332-16727  335-17036  336-17072
                         347-17657  373-19200  373-19240  418-22543  422-22883
DFPTBL    002356  G     #5-119
DIAGMC  = 000000         5-13        5-13
DIVMOD    003570        #36-196     38-275     39-305
DRIVE.    013132        #86-1898   *184-7228  *184-7248   206-8701   206-8714
DT.1      013534        #90-2117    425-23138   425-23140  425-23156  425-23263
DUMPER    024060  G     #180-6841   185-7398   187-7537   190-7690   193-7846   194-7905   196-8098   196-8107   196-8116
                         199-8347   199-8356   200-8369   205-8644   205-8655   205-8664   206-8706   212-9038   213-9051
                         219-9387   220-9411   220-9431   223-9582   226-9759   227-9780   227-9796   231-10007  232-10026
                         232-10043  232-10060  232-10076  233-10114  233-10119  233-10133  234-10161  234-10166  238-10380
                         239-10399  239-10416  239-10433  239-10449  240-10487  240-10492  241-10510  241-10534  241-10539
                         241-10560  243-10776  243-10794  243-10811  243-10828  243-10847  243-10881  243-10886  243-10903
                         243-10927  243-10932  243-10956  246-11141  246-11157  246-11176  247-11197  247-11214  247-11231
                         249-11476  249-11539  249-11614  251-11792  256-12030  256-12047  256-12065  257-12101  257-12134
                         258-12180  262-12375  262-12391  262-12408  263-12441  264-12487  266-12621  266-12637  266-12653
                         266-12672  269-12836  269-12855  269-12876  273-13059  273-13074  279-13381  280-13454  286-13726
                         292-14081  293-14102  293-14123  294-14144  294-14161  299-14448  305-14768  307-15187  311-15458
                         318-15802  320-15919  328-16351  330-16474  332-16800  332-16825  337-17127  341-17344  348-17723
                         354-18047  359-18341  360-18377  361-18416  365-18652  370-18914  371-18979  373-19297  377-19557
                         377-19579  377-19598  381-19818  382-19842  383-19885  383-19908  383-19924  386-20071  389-20194
                         392-20368  392-20403  395-20570  401-20864  406-21111  408-21350  412-21612  412-21635  413-21702
                         414-21732  416-21986  416-22010  417-22273  417-22297  418-22635  423-22936  425-23220  425-23238
                         425-23292  430-23606  431-23661  433-23765  437-23968  442-24207  442-24212  445-24382
D1.TEM  = 011152        #95-2397   *99-2692   *299-14416 *304-14721   307-15063 *307-15116 *311-15416 *317-15760 *319-15877
                        *332-16750 *336-17095 *347-17679 *373-19269 *400-20837 *418-22597   418-22603 *421-22850   422-22880
D2.TEM  = 011154        #95-2398   *99-2693   *299-14417 *304-14722   307-15064 *307-15117 *311-15417 *317-15761 *319-15878
                        *332-16751 *336-17096 *347-17680 *373-19270 *400-20838 *418-22598   418-22604 *421-22851   422-22881
EF.CON  = 000036  G     #91-2176
EF.NEW  = 000035  G     #91-2177
EF.PWR  = 000034  G     #91-2178
EF.RES  = 000037  G     #91-2175
EF.STA  = 000040  G     #91-2174
EIG.FM  = 006142        #92-2238
ELV.FM  = 006244        #92-2241
ERRBLK    002160  G     #5-96
ERRMSG    002156  G     #5-96
ERRNBR    002154  G     #5-96
ERRTYP    002152  G     #5-96
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SYMBOL	VALUE		REFERENCES								
ERR.CH	015212		#101-2973	405-21101	408-21344						
EVL	= 000004	G	#91-2187								
E$END	= 002100		#5-13								
E$LOAD	= 000035		#5-13	5-65							
E2.TEM	= 011156		#95-2399	*99-2694	*299-14418	*304-14723	307-15065	*307-15118	*311-15418	*317-15762	*319-15879
			*332-16752	*336-17097	*347-17681	*373-19271	*400-20839	*418-22599	418-22605	*421-22830	*421-22831
			422-22882								
FIND.C	015430		#103-3081	412-21605	413-21695						
FIRST.	016040		#109-3337	231-10000	238-10373	243-10769	268-12823	284-13653	298-14368	298-14390	318-15832
FIV.FM	= 006062		#92-2235	187-7543	205-8670	227-9769	227-9786	227-9802	231-10013	232-10032	232-10049
			232-10066	233-10086	233-10125	234-10143	234-10172	238-10386	239-10405	239-10422	239-10439
			240-10459	240-10498	241-10516	241-10545	243-10785	243-10800	243-10817	243-10834	243-10853
			243-10895	243-10909	243-10938	246-11148	246-11163	247-11186	247-11204	247-11221	249-11620
			256-12053	257-12107	258-12144	262-12381	262-12398	263-12418	263-12447	264-12493	266-12627
			266-12643	266-12662	266-12678	269-12842	269-12861	269-12882	299-14454	312-15468	337-17133
			365-18658	370-18920	378-19608	383-19914	386-20077	414-21738	416-22016	417-22306	
FMT.1	= 004222		#92-2205	195-7919	425-23248	433-23775	437-23982	442-24225			
FMT.10	= 004676		#92-2214	279-13394							
FMT.11	= 004750		#92-2215	187-7548							
FMT.12	= 005004		#92-2216	269-12847	269-12866	269-12887					
FMT.13	= 005034		#92-2217	281-13490							
FMT.14	= 005110		#92-2218	330-16485							
FMT.15	= 005150		#92-2219	360-18389							
FMT.16	= 005216		#92-2220	196-8137	200-8387	206-8681	213-9066	249-11494	249-11557	249-11630	
FMT.17	= 005306		#92-2221	184-7282							
FMT.18	= 005342		#92-2222								
FMT.19	= 005412		#92-2223	406-21122	408-21364	425-23265					
FMT.2	= 004266		#92-2206	194-7868	206-8715	223-9598	286-13745	341-17363	366-18673	431-23675	
FMT.20	= 005462		#92-2224	406-21129	408-21371						
FMT.21	= 005534		#92-2225	412-21622	412-21646	414-21716	414-21744	416-21997	416-22025	417-22284	417-22312
FMT.22	= 005606		#92-2226	418-22648	423-22946						
FMT.23	= 005652		#92-2227	181-6903							
FMT.24	= 005722		#92-2228	181-6910	181-6917	181-6924	181-6931	181-6938	182-6949	182-6956	182-6963
			182-6970	182-6977	182-6984	182-6991	183-7003	183-7012	183-7019		
FMT.25	= 005746		#92-2229	216-9225							
FMT.26	= 005764		#92-2230	216-9235							
FMT.3	= 004354		#92-2207								
FMT.4	= 004400		#92-2208	251-11802							
FMT.5	= 004430		#92-2209	337-17140	360-18360	360-18396	361-18431	401-20883			
FMT.6	= 004532		#92-2210	373-19306							
FMT.7	= 004562		#92-2211	258-12192	294-14177	382-19831	382-19851	383-19894			
FMT.8	= 004610		#92-2212	446-24408	446-24419						
FMT.9	= 004644		#92-2213	263-12452	264-12498	305-14777	371-18990	446-24394			
FNC.1	= 007726		#94-2340	223-9584							
FNC.10	= 010050		#94-2349	262-12377	262-12393	262-12410	263-12443	264-12489			
FNC.11	= 010060		#94-2350	262-12394	266-12623	266-12639	266-12655	266-12674			
FNC.12	= 010100		#94-2351	269-12838	269-12857	269-12878					
FNC.13	= 010112		#94-2352	318-15811	370-18919	377-19560	377-19582	377-19599			
FNC.14	= 010122		#94-2353	299-14449							
FNC.15	= 010136		#94-2354	307-15188	328-16356	370-18924					
FNC.16	= 010150		#94-2355	311-15460							
FNC.17	= 010162		#94-2356	328-16354	330-16477	370-18918	371-18983				

SYMBOL	VALUE	REFERENCES								
FNC.18	= 010172	#94-2357	348-17729	354-18053						
FNC.19	= 010204	#94-2358	389-20195							
FNC.2	= 007742	#94-2341	226-9761	227-9782	227-9798	256-12067	257-12103			
FNC.21	= 010216	#94-2359	279-13387							
FNC.22	= 010230	#94-2360	318-15803							
FNC.23	= 010242	#94-2361	185-7400	205-8666	249-11616					
FNC.3	= 007750	#94-2342	193-7850	194-7908	246-11144	247-11200	247-11217	248-11241	391-20338	395-20571
FNC.4	= 007756	#94-2343	231-10009	232-10062	233-10082	233-10121	234-10139	234-10168	396-20580	
FNC.5	= 007774	#94-2344	196-8120	200-8373	238-10382	239-10435	240-10455	240-10494	241-10512	241-10541
		242-10566	249-11480	249-11543	332-16802	332-16827	337-17128	348-17725	360-18347	360-18379
		361-18418	395-20573							
FNC.6	= 010004	#94-2345	187-7538	196-8119	200-8372	243-10778	243-10830	243-10849	243-10888	243-10905
		243-10934	243-10958	249-11479	249-11542	279-13382	341-17346	354-18049	365-18656	395-20572
FNC.7	= 010012	#94-2346	246-11143	247-11199	247-11216	248-11240	425-23294			
FNC.8	= 010022	#94-2347	251-11793	251-11796	256-12031	256-12048				
FNC.9	= 010036	#94-2348								
FORCE.	015602	#105-3184	412-21598	413-21686	416-21973	417-22256				
FOR.EC	015760	#107-3279	430-23594	431-23637	432-23700	433-23746	441-24157			
FOR.FM	= 006046	#92-2234	251-11797	256-12035	256-12071	273-13064	273-13079	281-13477	286-13731	330-16479
		371-18984	377-19562	377-19584	383-19929	389-20199	392-20373	393-20412	401-20869	412-21640
		416-21991	417-22278	425-23228	425-23297	437-23973				
F$AU	= 000015	#5-13								
F$AUTO	= 000020	#5-13								
F$BGN	= 000040	#5-13	5-39	6-226	6-274	6-305	6-337			
F$CLEA	= 000007	#5-13								
F$DU	= 000016	#5-13								
F$END	= 000041	#5-13	5-13	5-13	5-13	5-13	5-13	5-13	5-13	5-13
		5-13	5-13	5-13	5-13	5-13	5-13	5-13	5-13	5-39
		6-247	6-288	6-337						
F$HARD	= 000004	#5-13	6-226	6-247						
F$HW	= 000013	#5-13	5-119	5-139						
F$INIT	= 000006	#5-13								
F$JMP	= 000050	#5-13								
F$MOD	= 000000	#5-13	5-39	6-337						
F$MSG	= 000011	#5-13								
F$PROT	= 000021	#5-13	6-305	6-311						
F$PWR	= 000017	#5-13								
F$RPT	= 000012	#5-13								
F$SEG	= 000003	#5-13								
F$SOFT	= 000005	#5-13	6-274	6-288						
F$SRV	= 000010	#5-13								
F$SUB	= 000002	#5-13								
F$SW	= 000014	#5-13	5-150	5-162						
F$TEST	= 000001	#5-13								
GD.BLK	016070	#110-3388	332-16714	336-17063	340-17310	341-17331	346-17640	353-17994	353-18011	359-18318
		365-18618	365-18635	373-19228	376-19512	376-19534	392-20359	392-20394	393-20421	395-20551
		395-20561	400-20809	400-20814	405-21090	408-21333	411-21571	412-21599	413-21687	416-21926
		416-21974	417-22209	417-22261	418-22522	418-22622	421-22845	422-22919	425-23160	436-23932
		437-23947	441-24160	441-24171						
GOOD.B	011564	#86-1881	98-2560	110-3390	*184-7221	*307-15162				
G$CNTO	= 000200	#5-13								
G$DELM	= 000372	#5-13								

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SYMBOL  VALUE              REFERENCES
G$DISP  = 000003           #5-13
G$EXCP  = 000400           #5-13
G$HILI  = 000002           #5-13
G$LOLI  = 000001           #5-13
G$NO    = 000000           #5-13
G$OFFS  = 000400           #5-13      6-239     6-240     6-241     6-242     6-243     6-244     6-245     6-285
G$OFSI  = 000376           #5-13      6-239     6-240     6-241     6-242     6-243     6-244     6-245     6-285
G$PRMA  = 000001           #5-13      6-239
G$PRMD  = 000002           #5-13      6-240     6-241     6-242     6-244
G$PRML  = 000000           #5-13      6-243     6-245     6-285
G$RADA  = 000140           #5-13
G$RADB  = 000000           #5-13
G$RADD  = 000040           #5-13      6-242
G$RADL  = 000120           #5-13      6-243     6-245     6-285
G$RADO  = 000020           #5-13      6-239     6-240     6-241     6-244
G$XFER  = 000004           #5-13
G$YES   = 000010           #5-13      6-239     6-240     6-241     6-242     6-243     6-244     6-245     6-285
HELP    = 000000           #5-4       5-8       5-30      5-48      5-67      5-105     5-121     5-152     #6-167
                            6-228     6-249     6-276     6-291     6-313     6-330     6-340
HOE     = 100000  G        #92-2204
HW.OR.    011160           #86-1874  *285-13672 286-13716
I8E     = 010000  G        #92-2201
IDU     = 000040  G        #91-2190
IER     = 020000  G        #92-2202
INTER   = 010672           #95-2391   193-7845   241-10559  243-10955  279-13380  307-15186  318-15801  328-16350  332-16824
                            370-18913
IO.BUF    011600           #86-1889    98-2561   104-3098  *104-3099   109-3340   110-3391   111-3441   304-14673  304-14697
                            307-15037  307-15089  326-16223  329-16388 *332-16712 *336-17062 *340-17309 *341-17327  341-17338
                            346-17596  352-17952 *353-18002  354-18032 *359-18312 *359-18313 *364-18608 *364-18609 *365-18626
                            365-18643 *369-18866  369-18879  369-18888 *370-18943  370-18946 *371-18961  371-18966 *373-19190
                           *373-19194 *373-19195 *373-19196 *376-19511 *376-19526  377-19552  377-19574  381-19808  386-20064
                            388-20180 *392-20356 *392-20378 *393-20420 *395-20550 *405-21061 *405-21084 *406-21142 *408-21329
                           *411-21570 *411-21588  412-21630 *413-21680  414-21727 *416-21925 *416-21967  416-22005 *417-22208
                           *417-22250  417-22292 *418-22513  418-22630 *421-22841  422-22927  430-23597  431-23651  432-23702
                            433-23748 *436-23931 *441-24159  445-24372
ISR     = 000100  G        #91-2191
IXE     = 004000  G        #92-2200
I$AU    = 000041           #5-13
I$AUTO  = 000041           #5-13
I$CLN   = 000041           #5-13
I$DU    = 000041           #5-13
I$HRD   = 000041           #6-226     #6-247
I$INIT  = 000041           #5-13
I$MOD   = 000041           #5-13       5-39      #5-39      6-337     #6-337
I$MSG   = 000041           #5-13
I$PROT  = 000040           #5-13      #6-305
I$PTAB  = 000041           #5-13
I$PWR   = 000041           #5-13
I$RPT   = 000041           #5-13
I$SEG   = 000041           #5-13
I$SETU  = 000041           #5-13
I$SFT   = 000041           #6-274     #6-288
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SYMBOL	VALUE		REFERENCES
I$SRV	= 000041		#5-13
I$SUB	= 000041		#5-13
I$TST	= 000041		#5-13
J$JMP	= 000167		#5-13
LAST.B	016122		#111-3438 316-15710 316-15732 319-15854 382-19870
LAU	004210		#48-187 48-205
LAUTO	004164		#46-85 46-103
LCLEAN	105102		#448-24486 448-24506
LDU	004176		#47-135 47-153
LD.LNG	017132		#122-3973 307-15055 418-22602 422-22879
LINIT	024722		#184-7160 184-7310
LOAD.S	013604		#95-2407 99-2721
LOE	= 040000	G	#92-2203
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MSGH6	002646	6-244	#6-261							
MSGH7	002672	6-245	#6-262							
MSGS1	002726	6-285	#6-297							
M$DUMP	024070	180-6841	#181-6897							
NIB.SA	011152	#86-1872	95-2397	95-2398	95-2399	96-2434	96-2440	96-2446	96-2452	96-2458
		96-2464	97-2478	97-2484	97-2494	97-2503	114-3596	114-3603	114-3614	115-3626
		115-3638	115-3645	115-3656	115-3664	115-3676	116-3688	119-3826	119-3829	119-3837
		119-3839	119-3841	119-3848	119-3854	119-3856	119-3862	119-3866	*122-3990	*122-3997
		*122-4001	*123-4013	*123-4014	*123-4017	*123-4024	*123-4028	*123-4036	*123-4037	*123-4041
		*123-4049	*123-4050	401-20874						
NIN.FM	= 006166	#92-2239								
ONEFIL	= 000001	#2-4	3-1308	4-1309	5-34	5-164	6-190	6-353		
ONE.FM	= 006016	#92-2231	181-6899	190-7692						
OP.NUM	011560	#86-1878	*184-7220	184-7234	184-7240	184-7255	184-7266	223-9568	223-9596	263-12463
		326-16211	328-16372							
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O$AU	= 000001	#5-13	#5-46	5-65						
O$BGNR	= 000001	#5-13	#5-46	5-65						
O$BGNS	= 000001	#5-13	#5-46	5-65						

SYMBOL	VALUE		REFERENCES								
O$DU	= 000001		#5-13	#5-46	5-65						
O$ERRT	= 000001		#5-13	#5-46	5-65						
O$GNSW	= 000001		#5-13	#5-46	5-65						
O$POIN	= 000001		#5-13	#5-46	5-46	5-65					
O$SETU	= 000001		#5-13	#5-46	5-65						
PAR.DI	011566		#86-1883	*184-7214	219-9371	391-20334					
PD.TEM	013120		#86-1892	*99-2678	99-2702	*304-14710	305-14733	*307-15102	307-15125	*310-15401	311-15424
			*317-15749	317-15768	*319-15866	319-15885	*326-16236	326-16243	*329-16401	329-16407	*332-16739
			332-16761	*336-17084	337-17107	*347-17668	347-17691	*373-19255	373-19277	399-20772	*400-20826
			418-22558	*418-22559	422-22898	*422-22899					
PHR.1	= 007366		#94-2325	231-10011	232-10030	234-10141	238-10384	239-10403	241-10514	243-10780	243-10798
			243-10907	247-11184	251-11795	256-12033	256-12050	263-12416	264-12491	266-12676	269-12859
			273-13062	273-13077	293-14128	294-14149	294-14166	378-19606	383-19927	386-20075	389-20197
			412-21613	413-21703							
PHR.10	= 007564		#94-2334	307-15189	328-16357	370-18925					
PHR.11	= 007576		#94-2335	425-23239	430-23607						
PHR.12	= 007614		#94-2336	418-22638							
PHR.13	= 007636		#94-2337	423-22939							
PHR.14	= 007662		#94-2338	181-6898							
PHR.15	= 007714		#94-2339	216-9224	216-9234						
PHR.2	= 007404		#94-2326	227-9767	232-10047	233-10123	234-10170	239-10420	240-10496	241-10543	243-10815
			243-10890	243-10936	256-12069	257-12105	258-12142	262-12379	266-12625	269-12840	383-19912
PHR.3	= 007422		#94-2327	190-7691							
PHR.4	= 007454		#94-2328	185-7399	193-7852	196-8122	200-8375	205-8669	206-8707	249-11482	249-11545
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			361-18420	365-18653	431-23662	445-24383					
PHR.5	= 007472		#94-2329	187-7541	227-9784	227-9800	232-10044	232-10064	233-10084	239-10417	239-10437
			240-10457	242-10568	243-10812	243-10832	243-10851	243-10960	246-11146	246-11158	246-11161
			247-11202	247-11219	262-12396	263-12445	266-12641	266-12657	269-12880	293-14090	293-14107
			381-19820	412-21636	442-24214						
PHR.6	= 007504		#94-2330	232-10027	239-10400	243-10795	246-11177	258-12185			
PHR.7	= 007516		#94-2331	258-12181							
PHR.8	= 007540		#94-2332	377-19561							
PHR.9	= 007552		#94-2333	377-19583							
PNT	= 001000	G	#91-2194								
PRI	= 002000	G	#92-2199								
PRI00	= 000000	G	#91-2186								
PRI01	= 000040	G	#91-2185								
PRI02	= 000100	G	#91-2184								
PRI03	= 000140	G	#91-2183								
PRI04	= 000200	G	#91-2182								
PRI05	= 000240	G	#91-2181								
PRI06	= 000300	G	#91-2180								
PRI07	= 000340	G	#91-2179								
PRSN	002376	G	#5-160	215-9183	216-9195						
PTBL.P	011556		#86-1876	*184-7175	184-7176	184-7178	184-7179	184-7181	*184-7210	184-7211	184-7213
			184-7215	184-7217	184-7225	184-7275					
P.AAA	004222		#69-912	92-2205							
P.AAB	004266		#69-924	92-2206							
P.AAC	004354		#69-942	92-2207							
P.AAD	004400		#69-949	92-2208							
P.AAE	004430		#69-957	92-2209							

SYMBOL	VALUE	REFERENCES	
P.AAF	004532	#70-983	92-2210
P.AAG	004562	#70-991	92-2211
P.AAH	004610	#70-999	92-2212
P.AAI	004644	#70-1009	92-2213
P.AAJ	004676	#70-1018	92-2214
P.AAK	004750	#71-1036	92-2215
P.AAL	005004	#71-1046	92-2216
P.AAM	005034	#71-1054	92-2217
P.AAN	005110	#71-1069	92-2218
P.AAO	005150	#72-1084	92-2219
P.AAP	005216	#72-1097	92-2220
P.AAQ	005306	#72-1116	92-2221
P.AAR	005342	#72-1126	92-2222
P.AAS	005412	#73-1144	92-2223
P.AAT	005462	#73-1158	92-2224
P.AAU	005534	#73-1172	92-2225
P.AAV	005606	#73-1186	92-2226
P.AAW	005652	#74-1202	92-2227
P.AAX	005722	#74-1216	92-2228
P.AAY	005746	#74-1223	92-2229
P.AAZ	005764	#74-1228	92-2230
P.ABA	006016	#74-1237	92-2231
P.ABB	006024	#74-1239	92-2232
P.ABC	006034	#74-1242	92-2233
P.ABD	006046	#75-1250	92-2234
P.ABE	006062	#75-1254	92-2235
P.ABF	006100	#75-1259	92-2236
P.ABG	006120	#75-1265	92-2237
P.ABH	006142	#75-1271	92-2238
P.ABI	006166	#75-1278	92-2239
P.ABJ	006214	#75-1286	92-2240
P.ABK	006244	#75-1294	92-2241
P.ABL	006276	#76-1307	92-2242
P.ABM	006302	#76-1309	92-2243
P.ABN	006314	#76-1313	92-2244
P.ABO	006322	#76-1315	92-2245
P.ABP	006330	#76-1317	92-2246
P.ABQ	006336	#76-1319	92-2247
P.ABR	006344	#76-1321	92-2248
P.ABS	006360	#76-1325	92-2249
P.ABT	006374	#76-1329	92-2250
P.ABU	006406	#76-1333	93-2255
P.ABV	006416	#76-1336	93-2256
P.ABW	006426	#76-1339	93-2257
P.ABX	006436	#76-1342	93-2258
P.ABY	006442	#76-1344	93-2259
P.ABZ	006454	#76-1348	93-2260
P.ACA	006462	#76-1350	93-2261
P.ACB	006470	#76-1352	93-2262
P.ACC	006502	#77-1360	93-2263
P.ACD	006506	#77-1362	93-2264
P.ACE	006514	#77-1364	93-2265

SYMBOL	VALUE	REFERENCES	
P.ACF	006522	#77-1366	93-2266
P.ACG	006530	#77-1368	93-2267
P.ACH	006544	#77-1372	93-2268
P.ACI	006552	#77-1374	93-2269
P.ACJ	006560	#77-1376	93-2270
P.ACK	006574	#77-1380	93-2271
P.ACL	006602	#77-1382	93-2272
P.ACM	006610	#77-1384	93-2273
P.ACN	006624	#77-1388	93-2274
P.ACO	006632	#77-1390	93-2275
P.ACP	006646	#77-1394	93-2276
P.ACQ	006654	#77-1396	93-2277
P.ACR	006660	#77-1398	93-2278
P.ACS	006666	#77-1400	93-2279
P.ACT	006674	#77-1402	93-2280
P.ACU	006700	#77-1404	93-2281
P.ACV	006710	#77-1407	93-2282
P.ACW	006716	#77-1409	93-2283
P.ACX	006726	#78-1416	93-2284
P.ACY	006732	#78-1418	93-2285
P.ACZ	006746	#78-1422	93-2286
P.ADA	006754	#78-1424	93-2287
P.ADB	006764	#78-1427	93-2288
P.ADC	006772	#78-1429	93-2289
P.ADD	007004	#78-1433	93-2290
P.ADE	007016	#78-1437	93-2291
P.ADF	007026	#78-1440	93-2292
P.ADG	007036	#78-1443	93-2293
P.ADH	007046	#78-1446	93-2294
P.ADI	007054	#78-1448	93-2295
P.ADJ	007066	#78-1452	93-2296
P.ADK	007074	#78-1454	93-2297
P.ADL	007104	#78-1457	93-2298
P.ADM	007114	#78-1460	93-2299
P.ADN	007122	#78-1462	93-2300
P.ADO	007130	#78-1464	93-2301
P.ADP	007140	#78-1467	93-2302
P.ADQ	007152	#79-1475	93-2303
P.ADR	007156	#79-1477	93-2304
P.ADS	007174	#79-1482	93-2305
P.ADT	007210	#79-1486	93-2306
P.ADU	007216	#79-1488	94-2311
P.ADV	007224	#79-1490	94-2312
P.ADW	007232	#79-1492	94-2313
P.ADX	007240	#79-1494	94-2314
P.ADY	007246	#79-1496	94-2315
P.ADZ	007252	#79-1498	94-2316
P.AEA	007260	#79-1500	94-2317
P.AEB	007272	#79-1504	94-2318
P.AEC	007302	#79-1507	94-2319
P.AED	007310	#79-1509	94-2320
P.AEE	007316	#79-1511	94-2321

SYMBOL	VALUE	REFERENCES	
P.AEF	007330	#79-1515	94-2322
P.AEG	007340	#79-1518	94-2323
P.AEH	007346	#79-1520	94-2324
P.AEI	007366	#80-1530	94-2325
P.AEJ	007404	#80-1535	94-2326
P.AEK	007422	#80-1540	94-2327
P.AEL	007454	#80-1549	94-2328
P.AEM	007472	#80-1554	94-2329
P.AEN	007504	#80-1558	94-2330
P.AEO	007516	#80-1562	94-2331
P.AEP	007540	#80-1568	94-2332
P.AEQ	007552	#80-1572	94-2333
P.AER	007564	#80-1576	94-2334
P.AES	007576	#81-1584	94-2335
P.AET	007614	#81-1589	94-2336
P.AEU	007636	#81-1595	94-2337
P.AEV	007662	#81-1602	94-2338
P.AEW	007714	#81-1611	94-2339
P.AEX	007726	#81-1615	94-2340
P.AEY	007742	#81-1619	94-2341
P.AEZ	007750	#81-1621	94-2342
P.AFA	007756	#81-1623	94-2343
P.AFB	007774	#81-1628	94-2344
P.AFC	010004	#81-1631	94-2345
P.AFD	010012	#81-1633	94-2346
P.AFE	010022	#82-1640	94-2347
P.AFF	010036	#82-1644	94-2348
P.AFG	010050	#82-1648	94-2349
P.AFH	010060	#82-1651	94-2350
P.AFI	010100	#82-1657	94-2351
P.AFJ	010112	#82-1661	94-2352
P.AFK	010122	#82-1664	94-2353
P.AFL	010136	#82-1668	94-2354
P.AFM	010150	#82-1672	94-2355
P.AFN	010162	#82-1676	94-2356
P.AFO	010172	#82-1679	94-2357
P.AFP	010204	#82-1683	94-2358
P.AFQ	010216	#82-1687	94-2359
P.AFR	010230	#82-1691	94-2360
P.AFS	010242	#83-1699	94-2361
P.AFT	010256	#83-1703	94-2362
P.AFU	010266	#83-1706	95-2367
P.AFV	010274	#83-1708	95-2368
P.AFW	010302	#83-1710	95-2369
P.AFX	010310	#83-1712	95-2370
P.AFY	010316	#83-1714	95-2371
P.AFZ	010324	#83-1716	95-2372
P.AGA	010332	#83-1718	95-2373
P.AGB	010340	#83-1720	95-2374
P.AGC	010346	#83-1722	95-2375
P.AGD	010354	#83-1724	95-2376
P.AGE	010362	#83-1726	95-2377

SYMBOL		VALUE	REFERENCES							
P.AGF		010370	#83-1728	95-2378						
P.AGG		010376	#83-1730	95-2379						
P.AGH		010404	#83-1732	95-2380						
P.AGI		010412	#83-1734	95-2381						
P.AGJ		010420	#83-1736	95-2382						
P.AGK		010430	#83-1739	95-2383						
P.AGL		010436	#83-1741	95-2384						
P.AGM		010444	#83-1743	95-2385						
P.AGN		010454	#83-1746	95-2386						
P.AGO		010464	#84-1753	95-2387						
P.AGP		010526	#84-1765	95-2388						
P.AGQ		010570	#84-1777	95-2389						
P.AGR		010630	#84-1788	95-2390						
P.AGS		010672	#84-1800	95-2391						
P.AGT		010732	#85-1815	95-2392						
P.AGU		010772	#85-1826	95-2393						
P.AGV		011026	#85-1836	95-2394						
P.AGW		011060	#85-1845	95-2395						
P.AGX		011106	#85-1853	95-2396						
P.CAL		013144	#86-1906	100-2884	*100-2885	*100-2886	102-3012	*405-21099	406-21126	*408-21342
P.GEN		013152	#86-1909	102-2984	102-3012	*405-21096	406-21119	*408-21339	408-21358	408-21368
RAS.IN		013124	#86-1895	*184-7230	*184-7250	307-15164	369-18867	369-18877		
RD.CS1		017540	#126-4191	178-6746	212-8993					
RD.DA		020074	#132-4510	178-6756	212-9007					
RD.DAT		013130	#86-1897	*126-4206	126-4207	*129-4366	129-4367	*132-4525	132-4526	*135-4685
			*138-4846	138-4847	*141-5008	141-5009	*145-5194	145-5195	*149-5382	149-5383
			152-5521	*155-5655	155-5656	*159-5842	159-5843	*163-6032	163-6033	*168-6247
			*171-6407	171-6408	196-8127	200-8380	205-8674	213-9059	249-11487	249-11550
RD.DS		022774	#171-6392	179-6800						
RD.D1		021662	#158-5813	179-6805						
RD.D2		022174	#162-6003	179-6810						
RD.D3		022522	#167-6215	179-6815						
RD.EE		021536	#155-5653	178-6786						
RD.EL		021474	#152-5518	178-6791						
RD.ER		017716	#129-4351	178-6751	212-9000					
RD.E1		020652	#141-4992	178-6766	212-9021					
RD.E2		021072	#145-5177	178-6771	212-9028					
RD.MR		020252	#135-4670	178-6761						
RD.PA		020444	#138-4830	178-6776	212-9014					
RD.PD		021334	#149-5365	178-6781						
RD.REG		023470	#177-6719	196-8088	199-8337	205-8630	249-11470	249-11533	249-11608	
REG.IN		013136	#86-1902	158-5819	162-6009	167-6222	*249-11581	*249-11603	*249-11647	
REG.1	=	010256	#94-2362	181-6909						
REG.10	=	010346	#95-2375							
REG.11	=	010354	#95-2376							
REG.12	=	010362	#95-2377							
REG.13	=	010370	#95-2378							
REG.14	=	010376	#95-2379	182-6990	425-23241	425-23296				
REG.15	=	010404	#95-2380	183-7002	430-23609	431-23663	433-23768			
REG.16	=	010412	#95-2381							
REG.17	=	010420	#95-2382	181-6937	185-7401					
REG.18	=	010430	#95-2383	181-6916						

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SYMBOL  VALUE          REFERENCES
REG.19  = 010436       #95-2384  181-6923
REG.2   = 010266       #95-2367  182-6948  256-12052
REG.20  = 010444       #95-2385  183-7011
REG.21  = 010454       #95-2386  183-7018
REG.3   = 010274       #95-2368  182-6955  247-11232
REG.4   = 010302       #95-2369  182-6969
REG.5   = 010310       #95-2370  182-6962  257-12135  258-12182
REG.6   = 010316       #95-2371  181-6930  193-7847  382-19845  383-19888  383-19909
REG.7   = 010324       #95-2372  182-6976  206-8708
REG.8   = 010332       #95-2373
REG.9   = 010340       #95-2374  182-6983
REM.TB    013434       #89-2080  100-2882  100-2888  100-2894  106-3205  106-3210  106-3214
RE2       004144        43-66    #43-96
RE3       004142        43-74    #43-95
RE4       004140        43-83    #43-94
RH.ADD    013572       #90-2137  *184-7178  184-7189
RH.ERR  = 011060       #95-2395   185-7397  187-7536
RH.TYP    013574       #90-2138  *184-7180
RH.VEC    013576       #91-2143  *184-7182
SC.SET  = 010772       #95-2393
SEV.FM  = 006120       #92-2237   328-16359  332-16808  341-17352
SFPTBL    002376  G    #5-150
SIX.FM  = 006100       #92-2236   193-7853  196-8123  200-8376  242-10571  243-10963  248-11242  249-11483  249-11546
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                        348-17730  354-18054  360-18352  360-18384  361-18423  396-20581
STACK     012612       #86-1891  *97-2497  *97-2498  *97-2510  *97-2511  100-2843  102-2983  359-18336  360-18358
                        360-18371  360-18394  361-18411  361-18429
STK.OF    012600       #86-1890   95-2410  *99-2655   99-2713  *99-2717
STRIPP    014214       #99-2649   100-2836  359-18324
SVCGBL  = 177777       #5-13  #5-22  5-65  5-65  5-65  5-65  5-65  5-65  5-65
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SVCINS  = 177777       #5-13  #5-19  5-65  5-65  5-65  5-65  5-65  5-65  5-65
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SVCSUB  = 177777        #5-13     #5-21
SVCTAG  = 177777        #5-13     #5-23     5-139     5-139     5-139     5-162     5-162     5-162     6-247
                        6-247     6-247     6-288     6-288     6-288
SVCTST  = 177777        #5-13     #5-20
SYNC    = 010526        #95-2388  196-8106  199-8355  205-8654  233-10118 234-10165 240-10491 241-10538 243-10885
                        243-10931 273-13073 332-16799 337-17126 341-17343 359-18340 360-18376 361-18415 365-18651
                        377-19556 377-19578 377-19597 389-20193 392-20367 392-20402 401-20863 406-21110 408-21349
                        412-21611 412-21634 413-21701 414-21731 416-21985 416-22009 417-22272 417-22296 418-22634
                        423-22935 425-23237 425-23291 430-23605 433-23764 437-23967 442-24206
S$LSYM  = 010000        #5-13     #5-139    #5-162    #6-247    #6-288
TEN.FM  = 006214        #92-2240
THR.FM  = 006034        #92-2233  185-7402  194-7909  213-9055  220-9395  220-9415  220-9435  305-14772 307-15191
                        318-15806 320-15923 370-18927 373-19301 382-19826 382-19846 383-19889 391-20339 406-21115
                        408-21354 412-21616 414-21710 418-22639 423-22940 425-23242 430-23610 433-23769 442-24216
TIME.O  = 011106        #95-2396
TRBLE.  = 011026        #95-2394  395-20569
TST.LN    016154        #114-3577 299-14424 305-14747 307-15139 311-15438 317-15782 319-15899 348-17717 373-19291
                        401-20858
TWO.FM  = 006024        #92-2232  206-8709  221-9451  223-9585  318-15812 431-23664 445-24385
T$ARGC  = 000002        #5-65     5-65      #5-65     5-65      5-65      #5-65     5-65      5-65      #5-65
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T$CODE  = 000130        #6-239    6-239     #6-239    6-239     #6-239    6-239     #6-240    6-240     #6-240
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T$ERRN  = 000000        #5-13
T$EXCP  = 000000        #6-239    6-239     #6-240    6-240     #6-241    6-241     #6-242    6-242     #6-244
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T$FREE    105126  G     449-24530 449-24531 #449-24532
T$GMAN  = 000000        #5-13
T$HILI  = 000007        #6-239    6-239     #6-240    6-240     #6-241    6-241     #6-242    6-242     #6-244
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T$LAST  = 000000        #5-13
T$LOLI  = 000000        #6-239    6-239     #6-240    6-240     #6-241    6-241     #6-242    6-242     #6-244
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T$LSYM  = 010000        #5-13     5-13      5-139     5-162     6-247     6-288
T$NEST  = 177777        #5-13     5-39      #5-39     5-39      5-119     #5-119    5-119     5-139     5-139
                        5-139     #5-139    5-150     #5-150    5-150     5-162     5-162     5-162     #5-162
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SYMBOL  VALUE                 REFERENCES
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T$NS0   = 000000              #5-39      6-337
T$NS1   = 000021              #5-119     5-139    #5-150     5-162    #6-226    6-247    #6-274    6-288    #6-305
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T$PTHV  = 000000  G            5-65     #449-24536
T$PTNU  = 000000              #5-13
T$SAVL  = 177777              #5-13
T$SEGL  = 177777              #5-13
T$SUBN  = 000000              #5-13
T$TAGL  = 177777              #5-13
T$TAGN  = 010005              #5-13      5-119     5-119    #5-119    5-150    5-150    #5-150    6-226    6-226
                              #6-226     6-274     6-274    #6-274    6-305    6-305    #6-305
T$TEMP  = 000000              #5-103     5-103     5-103    #5-103    5-103    5-103    #5-103    5-103    5-103
                
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SYMBOL	VALUE		REFERENCES	
T13	035030	G	5-103	#235-10210
T14	036262	G	5-103	#242-10600
T15	037520	G	5-103	#243-10993
T16	040410	G	5-103	#248-11275
T17	041604	G	5-103	#249-11672
T18	042042	G	5-103	#252-11842
T19	043212	G	5-103	#259-12228
T2	026330	G	5-103	#188-7587
T20	044152	G	5-103	#265-12531
T21	044546	G	5-103	#266-12701
T22	045214	G	5-103	#270-12924
T23	045552	G	5-103	#274-13113
T24	046726	G	5-103	#282-13528
T25	047520	G	5-103	#287-13786
T26	050644	G	5-103	#295-14218
T27	051422	G	5-103	#300-14485
T28	052406	G	5-103	#306-14819
T29	053520	G	5-103	#307-15218
T3	026536	G	5-103	#191-7727
T30	054314	G	5-103	#312-15495
T31	055744	G	5-103	#321-15967
T32	057502	G	5-103	#331-16520
T33	060514	G	5-103	#332-16856
T34	061450	G	5-103	#338-17190
T35	062102	G	5-103	#342-17408
T36	063140	G	5-103	#349-17788
T37	064046	G	5-103	#355-18103
T38	065052	G	5-103	#362-18483
T39	065500	G	5-103	#366-18709
T4	027230	G	5-103	#195-7953
T40	066466	G	5-103	#372-19020
T41	067520	G	5-103	#373-19357
T42	070272	G	5-103	#378-19638
T43	071226	G	5-103	#384-19965
T44	071436	G	5-103	#387-20110
T45	071622	G	5-103	#389-20222
T46	072320	G	5-103	#393-20447
T47	072612	G	5-103	#396-20608
T48	073476	G	5-103	#402-20921
T49	074202	G	5-103	#407-21178
T5	027652	G	5-103	#196-8178
T50	074620	G	5-103	#408-21406
T51	075672	G	5-103	#415-21781
T52	076444	G	5-103	#416-22062
T53	077244	G	5-103	#417-22350
T54	100266	G	5-103	#418-22687
T55	101136	G	5-103	#423-22981
T56	102240	G	5-103	#425-23327
T57	103462	G	5-103	#434-23811
T58	104066	G	5-103	#438-24015
T59	104534	G	5-103	#443-24259
T6	030310	G	5-103	#201-8436

SYMBOL	VALUE		REFERENCES								
T60	105066	G	5-103	#447-24452							
T7	031140	G	5-103	#207-8748							
T8	032124	G	5-103	#214-9115							
T9	032360	G	5-103	#217-9263							
UAM	= 000200	G	#91-2192								
WRD.1	= 006276		#92-2242	227-9768	231-10012	232-10028	232-10045	233-10124	234-10171	238-10385	239-10401
			239-10418	240-10497	241-10544	243-10781	243-10796	243-10813	243-10891	243-10937	246-11147
			246-11159	246-11178	262-12380	266-12626	269-12841				
WRD.10	= 006406		#93-2255	213-9052	279-13386	305-14769	320-15920	330-16475	337-17130	341-17349	348-17727
			354-18051	373-19298	377-19558	377-19580	386-20072	396-20579	401-20865	416-21989	417-22276
			425-23226	433-23766	437-23971	442-24213					
WRD.11	= 006416		#93-2256	227-9766	227-9783	227-9799	233-10122	234-10140	234-10169	240-10495	241-10513
			241-10542	243-10889	243-10906	243-10935	246-11145	256-12032	256-12049	256-12068	257-12104
			257-12137	258-12184	262-12378	262-12395	266-12624	266-12640	266-12656	266-12675	269-12839
			269-12858	273-13061	273-13076	378-19605	383-19911	383-19926	386-20074	389-20196	
WRD.12	= 006426		#93-2257	187-7540	193-7851	196-8121	200-8374	205-8668	231-10010	232-10063	233-10083
			238-10383	239-10436	240-10456	242-10567	243-10779	243-10831	243-10850	243-10959	247-11201
			247-11218	249-11481	249-11544	249-11618	251-11794	262-12411	263-12444	264-12490	269-12879
			279-13385	299-14451	312-15465	328-16355	332-16804	332-16829	337-17129	341-17348	348-17726
			354-18050	360-18348	360-18380	361-18419	396-20578	414-21734	416-22012	417-22299	
WRD.13	= 006436		#93-2258	193-7848	247-11233	318-15804					
WRD.14	= 006442		#93-2259	194-7906	223-9583	247-11234	307-15190	328-16358	370-18926	371-18980	382-19843
			383-19886	425-23221	425-23293	437-23969					
WRD.15	= 006454		#93-2260	256-12034	256-12070	257-12106	258-12143	258-12186			
WRD.16	= 006462		#93-2261	256-12051	263-12417						
WRD.17	= 006470		#93-2262	257-12136	258-12183	383-19910					
WRD.18	= 006502		#93-2263	266-12677							
WRD.19	= 006506		#93-2264	226-9760	227-9781	227-9797	231-10008	232-10061	232-10077	233-10120	234-10138
			234-10167	238-10381	239-10434	240-10454	240-10493	241-10511	241-10540	241-10561	243-10777
			243-10829	243-10848	243-10887	243-10904	243-10933	243-10957	246-11142	247-11198	247-11215
			247-11235	256-12066	257-12102	262-12376	262-12392	262-12409	263-12442	264-12488	266-12622
			266-12638	266-12654	266-12673	269-12837	269-12856	269-12877	286-13728	332-16801	332-16826
			341-17345	348-17724	354-18048	359-18342	360-18378	361-18417	365-18655	377-19559	377-19581
			378-19604								
WRD.2	= 006302		#92-2243	232-10031	232-10048	234-10142	239-10404	239-10421	241-10515	243-10799	243-10816
			243-10908	246-11162	247-11185						
WRD.20	= 006514		#93-2265	242-10569	243-10961	273-13078					
WRD.21	= 006522		#93-2266	273-13060	273-13063	273-13075					
WRD.22	= 006530		#93-2267	299-14453	312-15467	332-16807					
WRD.23	= 006544		#93-2268	332-16803	332-16828	341-17347	360-18351	360-18383	361-18422	365-18657	392-20372
			393-20411								
WRD.24	= 006552		#93-2269	293-14086	293-14103	293-14124	294-14145	294-14162	337-17132	341-17351	401-20867
WRD.25	= 006560		#93-2270	337-17131	341-17350						
WRD.26	= 006574		#93-2271	389-20198							
WRD.27	= 006602		#93-2272	381-19821	383-19913	383-19925	383-19928				
WRD.29	= 006610		#93-2273	381-19819							
WRD.3	= 006314		#92-2244	227-9785	232-10065	239-10438	243-10833	247-11203	262-12397	266-12642	269-12860
WRD.30	= 006624		#93-2274	386-20073	386-20076						
WRD.31	= 006632		#93-2275	382-19844	383-19887						
WRD.32	= 006646		#93-2276	293-14089	293-14106	293-14127	294-14148	294-14165			
WRD.33	= 006654		#93-2277	293-14087	293-14104	293-14125	294-14146	294-14163			
WRD.34	= 006660		#93-2278	293-14091	293-14108	293-14129	294-14150	294-14167			

SYMBOL CROSS REFERENCE CREF

SYMBOL	VALUE	REFERENCES								
WRD.35	= 006666	#93-2279	279-13383	286-13730	305-14771	445-24384				
WRD.36	= 006674	#93-2280	286-13729							
WRD.37	= 006700	#93-2281	193-7849	194-7907	213-9053	305-14770	328-16353	330-16476	391-20336	
WRD.38	= 006710	#93-2282	213-9054							
WRD.39	= 006716	#93-2283	330-16478	360-18350	360-18382	361-18421	365-18654			
WRD.4	= 006322	#92-2245	227-9801	233-10085	240-10458	243-10852	247-11220	263-12446	264-12492	266-12661
		269-12881								
WRD.40	= 006726	#93-2284	280-13457	281-13473						
WRD.41	= 006732	#93-2285	373-19300							
WRD.42	= 006746	#93-2286	280-13458	281-13474						
WRD.43	= 006754	#93-2287	232-10029	232-10046	239-10402	239-10419	243-10797	243-10814	246-11160	246-11179
WRD.44	= 006764	#93-2288								
WRD.45	= 006772	#93-2289	279-13384	299-14450						
WRD.46	= 007004	#93-2290	280-13460	281-13476	373-19299					
WRD.47	= 007016	#93-2291	281-13475							
WRD.48	= 007026	#93-2292	311-15459							
WRD.49	= 007036	#93-2293								
WRD.5	= 006330	#92-2246	219-9390	293-14126	294-14147	294-14164	406-21114	408-21353		
WRD.50	= 007046	#93-2294	320-15922	348-17728	354-18052	370-18917	371-18982			
WRD.51	= 007054	#93-2295	280-13459	320-15921						
WRD.52	= 007066	#93-2296	187-7539	196-8118	200-8371	205-8667	249-11478	249-11541	249-11617	425-23240
		425-23295	430-23608							
WRD.53	= 007074	#93-2297	220-9445							
WRD.54	= 007104	#93-2298	280-13461							
WRD.55	= 007114	#93-2299	280-13462							
WRD.56	= 007122	#93-2300	196-8117	200-8370	205-8665	249-11477	249-11540	249-11615	318-15810	328-16352
		370-18915								
WRD.57	= 007130	#93-2301								
WRD.58	= 007140	#93-2302								
WRD.59	= 007152	#93-2303	378-19607							
WRD.6	= 006336	#92-2247	220-9414	220-9434	293-14088	293-14105	392-20371	393-20410		
WRD.60	= 007156	#93-2304	370-18916	371-18981						
WRD.61	= 007174	#93-2305	242-10570	243-10962	412-21639	414-21737	416-22015	417-22305		
WRD.62	= 007210	#93-2306	187-7542							
WRD.63	= 007216	#94-2311								
WRD.64	= 007224	#94-2312	401-20868	406-21113	408-21352					
WRD.65	= 007232	#94-2313								
WRD.67	= 007240	#94-2314	414-21733	416-21990	416-22011	417-22298	425-23227	437-23972		
WRD.68	= 007246	#94-2315								
WRD.69	= 007252	#94-2316	425-23225	437-23970						
WRD.7	= 006344	#92-2248	219-9389	220-9413	220-9433	220-9446	391-20337	392-20370	392-20405	
WRD.70	= 007260	#94-2317								
WRD.71	= 007272	#94-2318	433-23767							
WRD.72	= 007302	#94-2319	442-24215							
WRD.73	= 007310	#94-2320	401-20866							
WRD.74	= 007316	#94-2321	412-21615	412-21638	414-21709	414-21736	416-22014	417-22301		
WRD.75	= 007330	#94-2322	412-21614	412-21637	413-21704	414-21735	416-22013	417-22300		
WRD.76	= 007340	#94-2323	416-21988	417-22275	418-22637	423-22938				
WRD.77	= 007346	#94-2324	417-22277							
WRD.8	= 006360	#92-2249	220-9432	392-20404	406-21112	408-21351				
WRD.9	= 006374	#92-2250	219-9388	220-9412	332-16805	332-16830	392-20369	416-21987	417-22274	418-22636
		423-22937								

SYMBOL CROSS REFERENCE CREF

SYMBOL	VALUE		REFERENCES								
WRT.CS	017470		#124-4093	174-6547	210-8923	211-8955					
WRT.DA	020024		#130-4412	174-6557	210-8929	211-8963					
WRT.DS	022772		#169-6305	175-6601							
WRT.D1	021576		#156-5699	175-6606							
WRT.D2	022110		#160-5891	175-6611							
WRT.D3	022422		#164-6095	175-6616							
WRT.EE	021534		#153-5571	174-6587							
WRT.EL	021472		#150-5434	175-6596							
WRT.ER	017646		#127-4252	174-6552	210-8926	211-8959					
WRT.E1	020566		#139-4891	174-6567	211-8939	211-8971					
WRT.E2	020774		#142-5066	174-6572	211-8942						
WRT.MR	020202		#133-4571	174-6562							
WRT.PA	020360		#136-4729	174-6577	211-8936	211-8967					
WRT.PD	021226		#146-5253	174-6582	373-19226						
WRT.RE	023102		#173-6520	196-8083	199-8332	204-8608	249-11465	249-11528	249-11595		
WT.DAT	013126		#86-1896	*126-4203	126-4207	*129-4363	129-4367	*132-4522	132-4526	*135-4682	135-4686
			*138-4843	138-4847	*141-5005	141-5009	*145-5191	145-5195	*149-5379	149-5383	*152-5519
			152-5521	*155-5654	155-5656	*159-5841	159-5843	*163-6031	163-6033	*168-6244	168-6248
			*171-6404	171-6408	196-8128	200-8381	213-9060	249-11488	249-11551		
W.C.SI	013122		#86-1893	*184-7229	*184-7249	369-18878	369-18887	371-18967			
XOR.LN	016650		#118-3805	332-16776	337-17121						
X$ALWA	= 000000		#5-13								
X$FALS	= 000040		#5-13								
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$PATCH	002756	G	#6-327								
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			130-4412	132-4510	133-4571	135-4670	136-4729	138-4830	139-4891	141-4992	142-5066
			145-5177	146-5253	149-5365	156-5699	158-5813	160-5891	162-6003	164-6095	167-6215
			171-6392	173-6520	177-6719	226-9735	231-9991	238-10364	243-10760	245-11112	272-13020
			369-18865	395-20541	445-24360	449-24563					
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			105-3185	184-7160	216-9194	219-9370	223-9560	255-11999	262-12362	376-19504	436-23920
			441-24147	449-24562							
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			210-8911	249-11446	268-12809	277-13289	284-13643	291-14002	298-14353	303-14648	307-15022
			310-15355	316-15696	325-16203	332-16677	335-17021	340-17298	345-17584	352-17939	359-18299
			364-18597	373-19178	399-20765	405-21055	408-21300	411-21568	416-21923	417-22206	418-22506
			421-22828	425-23124	430-23582	449-24562					
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$T16	037534		#245-11112	248-11276							
$T17	040424		#249-11446	249-11673							
$T18	041620		#251-11773	252-11843							
$T19	042056		#255-11999	259-12229							

SYMBOL	VALUE	REFERENCES	
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$T22	044562	#268-12809	270-12925
$T23	045230	#272-13020	274-13114
$T24	045566	#277-13289	282-13529
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$T26	047534	#291-14002	295-14219
$T27	050660	#298-14353	300-14486
$T28	051436	#303-14648	306-14820
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$T3	026344	#190-7666	191-7728
$T30	053534	#310-15355	312-15496
$T31	054330	#316-15696	321-15968
$T32	055760	#325-16203	331-16521
$T33	057516	#332-16677	332-16857
$T34	060530	#335-17021	338-17191
$T35	061464	#340-17298	342-17409
$T36	062116	#345-17584	349-17789
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$T38	064062	#359-18299	362-18484
$T39	065066	#364-18597	366-18710
$T4	026552	#193-7830	195-7954
$T40	065514	#369-18865	372-19021
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$T43	070306	#381-19793	384-19966
$T44	071242	#386-20053	387-20111
$T45	071452	#388-20174	389-20223
$T46	071636	#391-20333	393-20448
$T47	072334	#395-20541	396-20609
$T48	072626	#399-20765	402-20922
$T49	073512	#405-21055	407-21179
$T5	027244	#196-8064	196-8179
$T50	074216	#408-21300	408-21407
$T51	074634	#411-21568	415-21782
$T52	075706	#416-21923	416-22063
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$T54	077260	#418-22506	418-22688
$T55	100302	#421-22828	423-22982
$T56	101152	#425-23124	425-23328
$T57	102254	#430-23582	434-23812
$T58	103476	#436-23920	438-24016
$T59	104102	#441-24147	443-24260
$T6	027666	#199-8315	201-8437
$T60	104550	#445-24360	447-24453
$T7	030324	#204-8591	207-8749
$T8	031154	#210-8911	214-9116